June 1951 Pages 209-252

The Journal *of the* SOCIETY OF DYERS AND COLOURISTS

Volume 67 Number 6

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THE SOCIETY OF DYERS AND COLOURISTS 32-34 PICCADILLY BRADFORD YORKS

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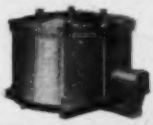
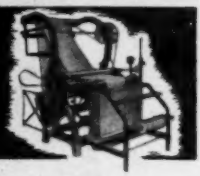


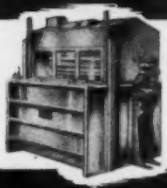
LOOSE STOCK DYEING MACHINE
For all types of loose wool and other loose stock. Built in stainless steel in two capacities, 100/250 lbs and 200/600 lbs.



LIGHT TYPE CALENDER
For finishing lightweight circular knitted fabrics, particularly interlock. Handles widths up to 35in.

PULSATOR HANK DYEING MACHINE
Stainless steel construction. Dyes all classes of wool, worsted, mixture and linen yarns. Capacities from 50 to 1,500 lbs.

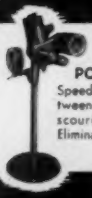
HEAVY TYPE CALENDER
Finishes circular knitted fabrics in wool, silk, cotton, rayon or mixture, in widths up to 36in.



YORKSHIRE PIECE GOODS DYEING MACHINE
For dyeing heavy or medium woollen or worsted piece goods in rope form. Built in stainless steel in three sizes.

DRYING AND FINISHING MACHINE
For drying and finishing all classes of circular and warp knitted fabrics. Built in two sizes.

SILK TYPE DYEING MACHINE
Shallow bath type for dyeing all types of silk or rayon fabrics in rope form. Four capacities — stainless steel.



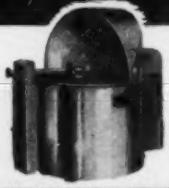
POWER FABRIC LOADER
Speeds up loading and unloading between skips and dyeing machines, scouring machines, hydros etc. Eliminates dirty fabric.

PACKAGE DYEING MACHINE
Constructed in stainless steel in four sizes from single package samples to 488-package model.

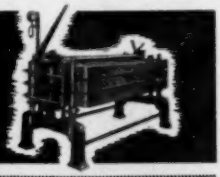
PRE-BOARDING MACHINE
For shaping full-fashioned or seamless nylon hose.

ROTARY DYEING MACHINE
The standard machine for dyeing nylon, pure silk and rayon hose. Stainless steel construction in 25,50,100 and 200 lbs. capacities.

BROMAC FINISHING MACHINE
Imparts luxury finish to circular knitted fabrics. Automatic — built in one size for fabrics up to 33in. finished width.



OVAL TYPE PADDLE DYEING MACHINE
For dyeing hose, garments, hats and loose articles. Built in stainless steel in three sizes.



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Many colours -one machine

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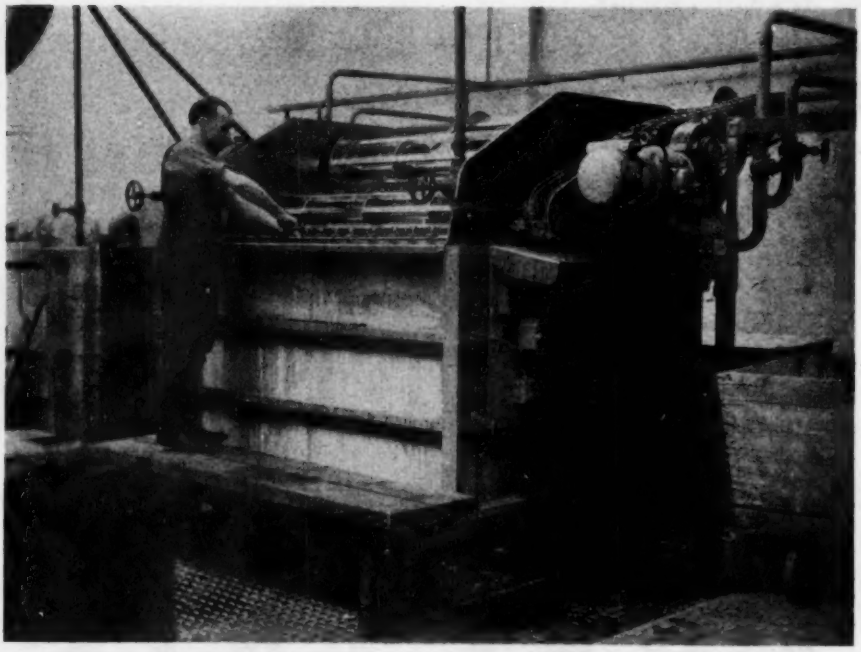

No crevices are allowed in Metal Propellers machines because all corners are rounded and polished. The robust construction ensures long life. These machines are particularly recommended for dyeing delicate tints.

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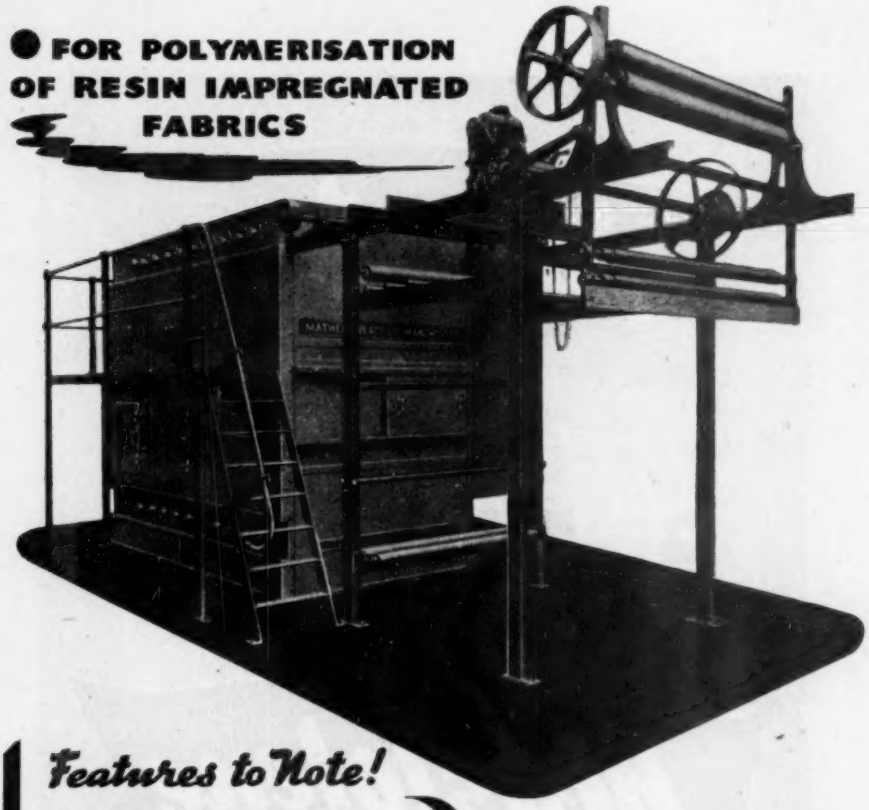

Features to Note!

- Exceptionally high production
- Adequate polymerisation with soft or firm handle as required
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SOLUTIONS MADE WITHOUT BOILING

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EASILY WASHED OFF LEAVING SOFT HANDLING

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Metachrome Blue RB

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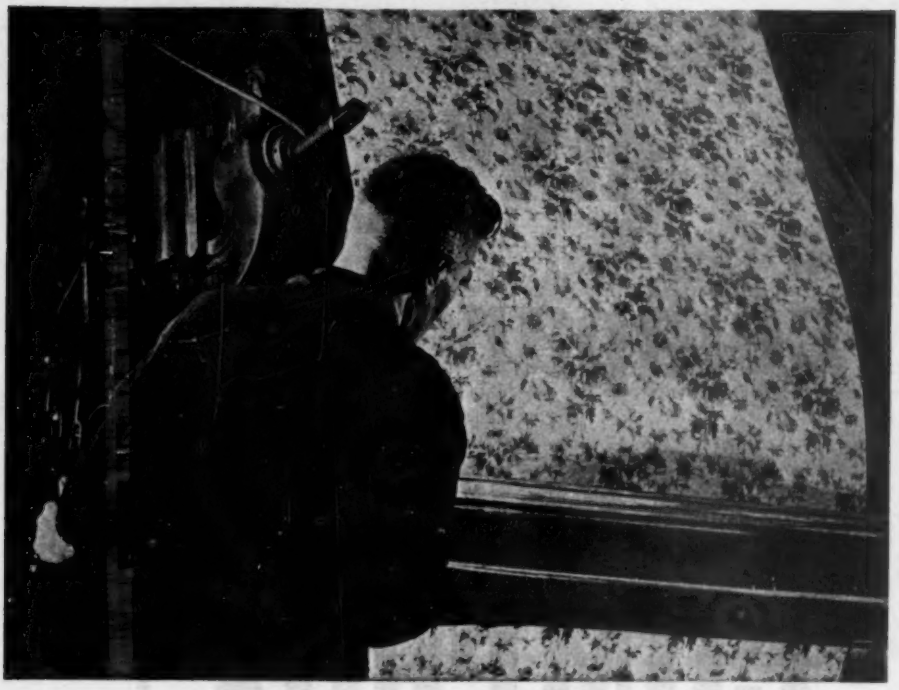

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Whether your problem is scouring before or after printing or after dyeing, or whether it is dyeing in the piece or by the hank, the chief enemy of good results is lime soap. Lime soap on the fibre produces a harsh feel, streaky results and poor colours. Calgon (Sodium Metaphosphate) used in scouring and dyeing gives better and brighter colours with more certain results, and the piece handles better. The Cotton, Rayon, Silk and Wool industries are finding life much brighter with Calgon. Write for a copy of "Calgon in the Textile Industry"

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Comprox is available in two forms — LIQUID AND PASTE :—

Comprox 'A'— Neutral liquid detergent and wetting agent of the Sodium Higher Alkyl Sulphate group.

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Comprox is British from raw material to finished product.

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★ Our Technical Service Dept. will make recommendations to meet *your* particular needs.

★ Comprox can be supplied in any quantities — large or small.

★ Deliveries are prompt and regular from strategically placed depots.

★ Our Technical Service will always be ready to give further advice and assistance.

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WOOL, WOOL MIXTURES

Anti-felting

permanent shrink-proofing

Treatment with Beetle Resin BT316 produces permanent shrink-proofing and anti-felting finishes on wool — pure wool fabrics, wool mixtures such as wool/cotton, wool/viscose rayon, wool pile fabrics (moquette, carpets), etc. Moreover . . .

. . . THE BEETLE FINISH is permanent for the life of the goods — no signs of 'fuzzing' • produces marked shrinkage reduction after laundering or sponging and pressing • greatly reduces the tendency to 'felt' — particularly useful in stabilising wool pile fabrics • increases weight and tensile strength • increases fastness to laundering and dry cleaning of many dyestuffs • will not discolour • produces practically no change in moisture regain • increases resistance to alkali • reduces shrinking and creasing tendencies of wool mixtures with cotton or viscose rayon.

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including *Cotton* and *Rayon* (shrink-proofing, crease-resistance), *Lace* and *Net* (stabilising) and *Wool* (shrink-proofing and anti-felting). Beetle is used also for Permanent Mechanical finishes; as a bonding medium for Pigment Colours and for the conversion of sheepskin into Beaver Lamb.

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- can be mixed with each other to give two or more effects by a single process.
- have ease of solubility and dilution in water and are easily applied.
- have good storage life.
- include both the urea and melamine types in varying degrees of condensation.
- are backed by a full B.I.P. Technical Advisory Service.

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'BEETLE' is a trade mark registered in Great Britain and in most countries of the world.

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Claimed nearly all the aether trade
Throughout the trading nation;
And I with confidence might say,
That none before me knew the way
To do the operation.

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SECOND EDITION REVISED AND ENLARGED

IDENTIFICATION OF DYES ON TEXTILE FIBRES

and

DETECTION OF METALS IN FIBROUS MATERIALS, DYES, AND ORGANIC PIGMENTS

by

ELLIS CLAYTON F.R.I.C

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THE SOCIETY OF DYERS AND COLOURISTS
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YORKSHIRE

REPORT
OF THE COMMITTEE
ON THE

FASTNESS OF DYES ON LEATHER

•

PRICE
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FROM ALL MIXING TROUBLES..

Here is a new type of coupling for Kestner Portable Electric Stirrers and Mixers. A quick action chuck—that allows the release of the shaft by one turn of the wrist — no spanner is necessary! When replaced, however, it is rigid and self-locking.

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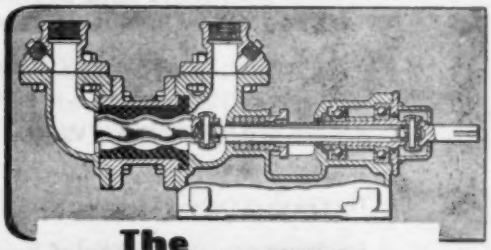

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The Journal of the Society of Dyers and Colourists

(Subscription rates for non-members 60/- per annum, post-free)
(Abstracts section only printed on one side of paper— 20/- per annum)

NOTICE TO MEMBERS AND SUBSCRIBERS

Readers requiring *general information* regarding the Official Notices, List of Officers of the Society, etc. should consult pages 1–6 of the January 1951 and pages 345–348 of the July 1950 issues of the *Journal*, or write to *The General Secretary*, The Society of Dyers and Colourists, 32–34 Piccadilly, Bradford, Yorkshire (*Telephone* Bradford 25138–9). *Editorial Communications* should be addressed to *The Editor*, at the same address.

Forthcoming Papers

The following papers have been accepted by the Publications Committee, and will appear in future issues of the *Journal*—

MERCER LECTURE

Some Trials by Ingenious Inquisitive Persons— Regenerated Protein Fibres — *D. Traill*

COMMUNICATIONS

Reduction of Direct Dyes during the Dyeing of Viscose Rayon — *W. Armfield*

A Study of the Polymerisation of Methacrylamide in Wool — *N. K. Boardman and M. Lipson*

Advances in the Application of Vat Dyes to Viscose Rayon Cakes — *H. Hampson*

The Colour of Organic Compounds— III — *E. B. Knott*

The Preparation and Properties of Regenerated Cellulose containing Vinyl Polymers. I— Internal Deposition of Polymers — *G. Landells and C. S. Whewell*

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Beggar's Bridge, Glaisdale

. . . of rural Britain stand

as a memorial to craftsmanship and skill in surmounting difficulties.

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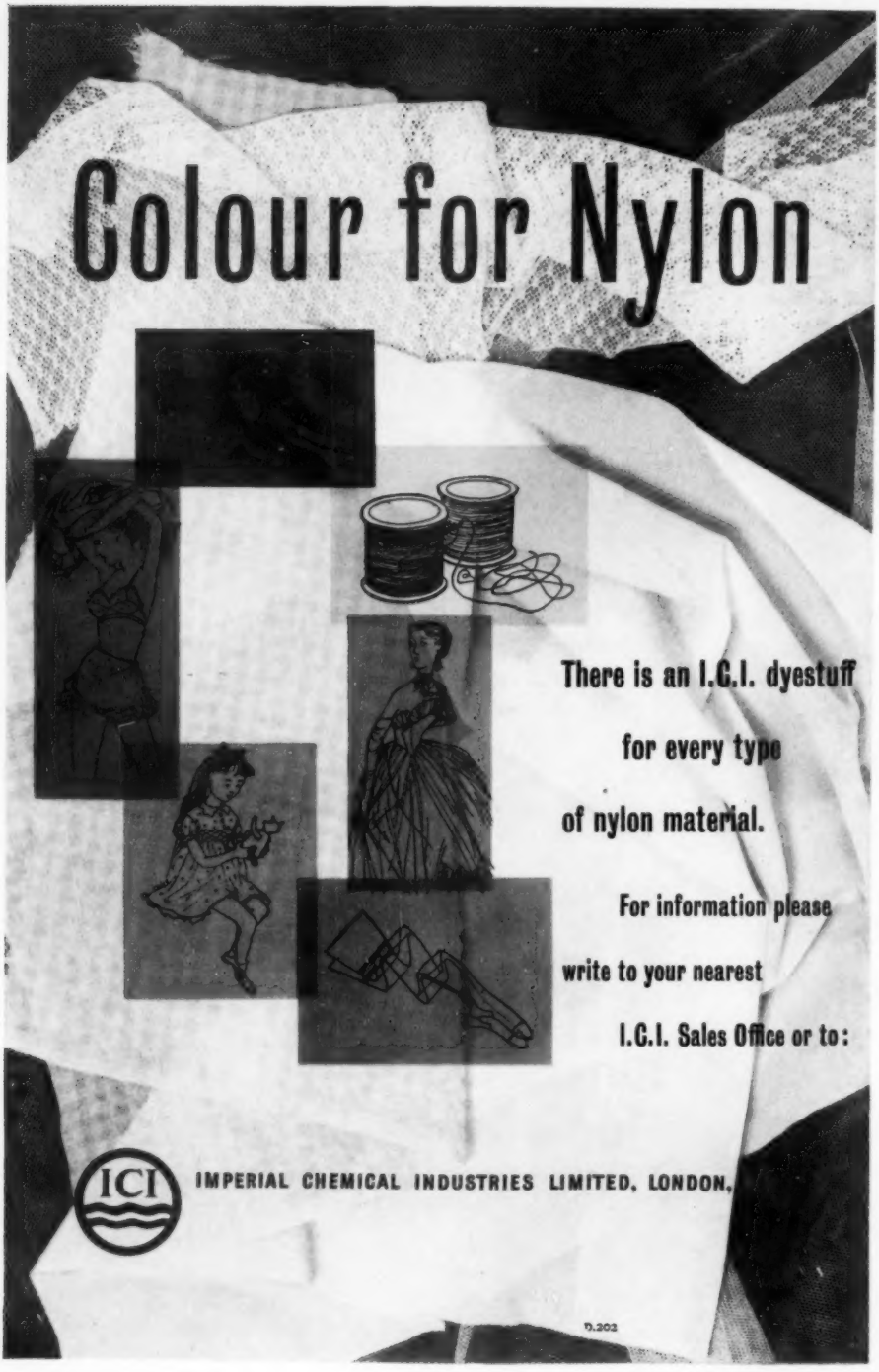
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There is an I.C.I. dyestuff
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of nylon material.
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IMPERIAL CHEMICAL INDUSTRIES LIMITED, LONDON.
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President of the Society of Dyers and Colourists 1950–1952

THE JOURNAL
OF THE
Society of Dyers and Colourists

Volume 67—Number 6 JUNE 1951 *Issued Monthly*

Proceedings of the Society

Annual General Meeting

The Sixty-seventh Annual General Meeting of the Society of Dyers and Colourists was held at the Grand Hotel, Leicester, on Friday, 30th March 1951, at 5-0 p.m., the President (Mr. FRED SCHOLEFIELD) being in the chair, and about fifty members of the Society being present.

The General Secretary (Dr. C. J. W. HOOPER) read the minutes of the Sixty-sixth Annual General Meeting, which were accepted as a correct record on the motion of Mr. J. PORTER seconded by Mr. J. V. SUMMERSGILL; and the minutes of an Extraordinary General Meeting, held on 14th June 1950, which were accepted as a correct record on the motion of Mr. A. THOMSON seconded by Mr. B. KRAMRISCH.

REPORT OF THE COUNCIL

Council is pleased to report that the Society has continued to expand its activities during the year ended 31st December 1950. There has been a small net increase in the number of members, and Council wishes to emphasise that an increasing and active membership is essential for the further progress of the Society; members are therefore strongly urged to bring to the notice of suitable candidates the benefits to be gained from membership of the Society.

The loss by death of twelve members has been reported during the year, including Mr. E. B. Adams, who served the Society on the Direct Cotton and Vat Dyes Committees as well as on the Manchester Section Committee, Professor W. R. Atkin, who assisted the Society in its work connected with leather, Mr. T. F. Gorton, a member of the Mothproofing Committee, and Mr. L. Thompson, who had been both Honorary Secretary and Chairman of the Manchester Section.

Mr. F. Scholefield was elected President in March 1950, and as Chairman of Council has contributed greatly to the fruitful outcome of its discussions. Council is grateful to him for his sustained interest in the various activities of the Society.

Council was grieved to learn toward the end of the year of the serious illness of Mr. G. E. Holden, the Immediate Past President, but is gratified by the news of his steady recovery. It welcomed the suggestion of the President that Honorary Membership of the Society should be conferred on Mr. Holden in recognition of his long period of devoted service to the Society and to the dyemaking and dye-using industries.

Council would like to take this opportunity of congratulating Dr. A. J. Turner on the award of the C.B.E. and Dr. G. L. Royer on that of the Olney Medal of the A.A.T.C.C. for 1950.

The Sections continue to flourish and to hold interesting series of lecture meetings, colloquia, and social gatherings, including annual dinners and in several cases ladies' evenings. All the Sections now have their own bye-laws, approved by Council.

The Society's relations with the Textile Institute are of a close and cordial nature, and during the year the joint publication, *Review of Textile Progress*, has appeared for the first time. The Sections of the Society have maintained close contact with those of the Institute and other similar organisations; joint meetings are frequently held, and in several cases joint syllabuses for all meetings are available.

Relations with cognate societies on the Continent have been maintained on a cordial basis.

The Society was officially represented at the 23rd Congress of the Association des Chimistes de l'Industrie Textile, held at Lille in September 1950, by Messrs. H. Blackshaw, J. Boulton, and E. A. Swift, who were warmly welcomed by their French colleagues. Greetings were exchanged by our President at the Annual Meeting of Svenska Färgeritekniska Riksförbundet in Stockholm in August and by Mr. J. Barritt at the Annual Conference of the Belgian Textile Society in Brussels in October. Greetings have been received also from the Schweizerischer Verein der Chemiker-Coloristen, who have extended an invitation to members of the Society in Switzerland to attend their meetings.

The President was invited to attend the Second Canadian Textile Seminar, but owing to prior engagements abroad he was unable to do so; a message from the President conveying the greetings of the Society and its best wishes for the success of the Seminar was read at the opening session. The Society had also been invited to sponsor a lecture and was able to arrange for a paper on *Trends in Dyeing and Finishing Machinery* to be presented by Mr. C. C. Wilcock and Mr. R. A. McFarlane.

Balance Sheet as at 31st December 1950

31.12.49	SURPLUS AND LIABILITIES	£ s. d.	£ s. d.
	SURPLUS — DEVELOPMENT		
	Balance of Accumulated Funds	24,492 14 8½	
	Less Accumulated Expenditure on New *Colour Index* ...	3,615 16 1	20,876 18 7½
1,818	FOUNDATION FUND		1,850 13 0
100	KNECHT MEMORIAL FUND		100 0 0
2,000	GEORGE DOUGLAS LECTURE FUND		2,000 0 0
	AMOUNTS RECEIVED IN ADVANCE		
154	Subscriptions	95 19 6	
175	Light Symposium Orders ...	- - -	95 19 6
	CURRENT LIABILITIES		
2,442	Sundry Creditors per Schedule		1,713 16 9
£25,334			£26,637 7 10½

31.12.49	ASSETS	£ s. d.	£ s. d.
	DEVELOPMENT ACCOUNT INVESTMENTS		
15,400	As per Schedule (at cost) ...		17,399 10
	(Market Value — £16,754)		
	FOUNDATION FUND INVESTMENTS		
1,818	As per Schedule (at cost) ...		1,850 13
	(Market Value — £1,848)		
	KNECHT MEMORIAL FUND INVESTMENTS		
100	As per Schedule (at cost) ...		100 0
	(Market Value — £96)		
	GEORGE DOUGLAS LECTURE FUND INVESTMENTS		
2,000	As per Schedule (at cost) ...		2,000 0
	(Market Value — £1,815)		
	CURRENT ASSETS		
33	Cash in Hand	35 17 3½	
2,612	Cash in Bank	264 4 9	
2,066	Debtors per Schedule	2,856 1 1	
758	Stocks per Schedule	1,563 8 10	
5,469			4,719 6 1
	FIXED ASSETS		
	Furniture and Equipment per Schedule		
	Library	66 17 6	
429	General	391 19 8	
118	*New Colour Index*	107 0 0	
547			567 17
£25,334			£26,637 7 1

H. JENNISON, *Honorary Treasurer*
JOHN BARRITT, *Honorary Secretary*

AUDITORS' REPORT

We have examined the above Balance Sheet with the Books and Documents of the Society produced to us.
In our opinion the above Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the Society's affairs according to the best of our information and the explanations given to us and as shown by the Books of the Society.

RAWLINSON, GREAVES & MITCHELL
Chartered Accountants
Auditors

12th January 1951
Bradford

GENERAL REVENUE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER 1950

31.12.49	EXPENDITURE	£ s. d.	£ s. d.
	To GENERAL OFFICE		
351	Printing and Stationery ...	358 8 8	
143	Postages	147 12 11	
1,368	Salaries and Wages	1,406 3 8	
314	Rents, Rates, and Insurances	164 16 8	
57	Electricity and Heating ...	35 2 4	
119	Telephone	78 15 9	
20	Bank Charges	17 4 0	
99	Audit and Accountancy ...	94 10 0	
-	Travelling Expenses ...	39 18 0½	
333	Sundry Expenses	301 19 3	
	Investment Charges (Midland Bank Executor & Trustee Co. Ltd.)	4 19 6	
51			
2,855		2,681 10 9½	
180	*Less* Allocation to New *Colour Index*	- - -	
2,675			2,681 10 9½
513	" SECTIONAL EXPENSES		577 18 9
48	" DEPRECIATION ON GENERAL OFFICE FURNITURE		47 0 0
40	" MERCER LECTURE EXPENSES ...	38 19 3½	
20	*Less* Donation	20 0 0	
26			18 19 3½
	" JOURNAL		
5,710	Printing and Publishing ...	5,900 19 3½	
371	Postages	558 6 1½	
893	Editorial Charges	988 10 11	
111	Own Journals	200 15 4	
337	Abstractors' Fees and Book Reviews	302 18 0	
-	Miscellaneous Publications ...	3 7 6	
-	Rent, Rates, and Insurance	79 5 6	
-	Electricity and Heating ...	16 17 8	
-	Telephone	31 9 9	
-	Printing and Stationery ...	71 15 7	
7,427			8,154 5 8
83	" ANNUAL MEETING AND DINNER		102 11 2
70	" DONATIONS AND SUBSCRIPTIONS		39 19 6
80	" REPAIRS AND RENEWALS ...		87 9 2½
-	" LIBRARY UPKEEP		41 9 3
			11,751 3 7½
536	" SURPLUS FOR THE YEAR TO ACCUMULATED FUNDS ...		2,650 5 9½
£11,508			£14,401 9 5

31.12.49	INCOME	£ s. d.	£ s. d.
	By SUBSCRIPTIONS		
4,542	Members	4,630 10 5	
63	Juniors	68 15 0	
4,605			4,699 5
	" JOURNAL ACCOUNT		
2,307	Sale of Journals and Reprints	2,991 2 1	
4,044	Advertisements	6,018 19 0	
6,351			9,010 1
	" STOCK		
43	Increase in Stock of Journals		77 16
102	" DONATIONS		102 2
407	" DIVIDENDS ON INVESTMENTS ... (Gross)		512 4
£11,508			£14,401 9

SCHEDULE OF DEVELOPMENT ACCOUNT INVESTMENTS

	Balances 1949	Alterations	Balances 1950	Market Values 1949	Market Values 1950
	£ s. d.		£ s. d.	£	£
£2,763 3s. 8d. 3% British Transport Guaranteed Stock 1978/88	2,598 17 0		2,598 17 0	2,480	2,526
£750 2½% National War Bonds 1949/51	750 0 0		750 0 0	760	751
£546 8½% Conversion Loan	557 0 0		557 0 0	511	525
£1,255 2½% National Defence Bonds	1,255 0 0		1,255 0 0	1,255	1,255
£2,749 16s. 9d. 3% Savings Bonds 1960/70	2,750 0 0		2,750 0 0	2,660	2,715
£750 2½% Exchequer Bonds 1955	750 0 0	Converted to 2½% 16. 2. 1950	750 0 0	751	762
500 National Savings Certificates 15s. units	375 0 0		375 0 0	375	375
£2,000 3% British Gas Stock 1990/95	2,000 0 0		2,000 0 0	1,774	1,825
£2,017 11s. 6d. 3% Treasury Stock 1966 or after	1,957 1 0		1,957 1 0	1,675	1,695
£1,500 12s. 9d. 3% British Electricity Guaranteed Stock 1968/73	1,495 19 0		1,495 19 0	1,429	1,453
£901 3s. 6d. 3% Southern Rhodesia 1971/73	910 13 9		910 13 9	856	870
Yorks. County Savings Bank	— — —	Invested during year	2,000 0 0	—	2,000
	£15,299 10 9		£17,399 10 9	£14,530	£16,754

SCHEDULE OF DEBTORS

	31.12.49	31.12.50
	£ s. d.	£ s. d.
Rates and Insurances in advance	30 6 0	28 5 4
Income Tax Repayment due	62 10 8	89 10 8
Journals	265 11 5	476 19 9
Advertisements	1,256 6 6	1,748 14 0
Fastness Tests	183 0 0	26 6 4
Wool Dyeing	31 12 9	7 12 9
"Replika" *Colour Index* and Supplement	185 15 5	394 18 6
Dyeing Symposium	14 9 4	5 8 9
Reprints	1 13 1	47 18 7
Identification of Dyes	39 0 3	11 4 4
Light Symposium	10 12 0	16 17 1
Sundries	12 12 0	4 5 0
	£2,066 9 5	£2,856 1 1

SCHEDULE OF CREDITORS

	£ s. d.	£ s. d.
Printing and Stationery	17 13 8	3 16 0
Accountancy and Professional Charges	105 0 0	105 0 0
General Expenses	74 3 2	82 18 9
New *Colour Index*	2 18 6	— — —
Sectional Expenses	5 18 0	6 8 6
Sundry Publications	17 17 8	14 2 6
Journal Expenses —		
Printing and Publishing	2,106 15 10	1,370 10 4
Postages	65 1 3	108 11 5
Abstractors' and Book Reviewers' Fees	18 19 11	9 10 0
Amounts received in advance	— — —	12 19 3
	£2,441 8 9	£1,713 16 9

SUMMARY OF STOCK

	£ s. d.	£ s. d.
Fastness Tests, etc.	160 18 7	93 3 6
Journals	544 3 9	583 4 6
Light Symposium	— — —	38 15 10
"Replika" *Colour Index* and Supplement	11 10 0	761 12 0
Identification of Dyes	1 6 10	86 8 0
Dyeing Symposium	11 3 0	— — —
Wool Dyeing	28 10 0	— — —
	£757 17 2	£1,563 3 10

SCHEDULE OF FOUNDATION FUND INVESTMENTS

	Balances 1949	Market Values 1949	Market Values 1950	Balances 1950
	£ s. d.	£	£	£ s. d.
£1,245 2½% National Defence Bonds, at cost	1,245 0 0	1,245	1,245	1,245 0 0
1,000 National Savings Certificates, 10s. units	500 0 0	500	500	500 0 0
£68 8s. 6d. 3% Savings Bonds 1960/70	69 9 0	66	67	69 9 0
Midland Bank Ltd. (Cash awaiting investment)—				
(No. 2 A/c.)	3 15 0	4	—	— — —
(Part No. 1 A/c.)	— — —	—	36	36 4 0
	£1,818 7 0	£1,815	£1,848	£1,850 13 0

SCHEDULE OF OFFICE FURNITURE AND FITTINGS

	General		New "Colour Index"		Library
	31.12.49	31.12.50	31.12.49	31.12.50	31.12.50
	£	£ s. d.	£	£	£ s. d.
Balance 1st January 1949	420	429 12 8	131	116	— — —
Additions during year	56	96 10 8	—	—	34 5 0
	476	526 12 2			34 5 0
Less Sales		50 0 0			
		476 12 2			
Less Depreciation at 10% p.a.	47	47 0 0	13	11	3 0 0
Balances 31st December 1950	429	429 12 2	118	107	31 5 0
Less Transfer to Library		37 12 6			37 12 6
Balance 31st December 1950 per Balance Sheet	£429	£391 19 8	£118	£107	£68 17 6

SCHEDULE OF GEORGE DOUGLAS LECTURE FUND INVESTMENTS

	Balances 1949	Market Values 1949	Market Values 1950	Balances 1950
	£2000	£1,781	£1,815	£2,000
£1983 17 0 3% British Transport Stock, 1978 88				

SCHEDULE OF KNECHT MEMORIAL FUND INVESTMENTS

	Balances 1949	Market Values 1949	Market Values 1950	Balances 1950
	£100	£94	£96	£100
£98 16 6 3% Southern Rhodesia Stock 1971/73				

SUNDRY ACCOUNTS FOR THE YEAR ENDED 31ST DECEMBER 1950

FASTNESS TESTS, etc.

EXPENDITURE

	£ s. d.	£ s. d.
To STOCK OF CLOTH 1ST JANUARY 1950	160 18 7	
" CLOTH	69 10 5	
" BUNCHES	79 0 0	
" COST OF 2ND REPORT OF COMMITTEE	57 10 0	
" COST OF OTHER REPORTS	22 4 0	
" LOSS OF DUTY ON WASHING MACHINE	2 9 0	
" SURPLUS TO ACCUMULATED FUNDS	34 2 1	
	£425 14 1	

INCOME

	£ s. d.	£ s. d.
By SALES		
Bunches	185 7 6	
Reports	21 19 1	
Cloth	125 4 0	
		332 10 7
" STOCK 31st December 1950		93 3 6
		£425 14 1

"Identification of Dyes"

EXPENDITURE	£ s. d.	£ s. d.	INCOME	£ s. d.	£ s. d.
To Stock 1st January 1950	1 6 10		By Sales	55 14 9	
,, Printing	112 10 0		,, Stock 31st December 1950	86 8 0	
,, Sundry Expenses	1 10 4½				
,, Surplus to Accumulated Funds	26 15 6½				
	£142 2 9			£142 2 9	

"Wool Dyeing"

EXPENDITURE	£ s. d.	£ s. d.	INCOME	£ s. d.	£ s. d.
To Stock 1st January 1950	28 10 0		By Sales	38 7 2	
,, Sundry Expenses	2 15 4½		,, Over-reserve for Royalties	9 18 4	
,, Surplus to Accumulated Funds	17 0 1½				
	£48 5 6			£48 5 6	

"Replika" Colour Index and Supplement

EXPENDITURE	£ s. d.	£ s. d.	INCOME	£ s. d.	£ s. d.
To Stock at 1st January 1950			By Sales		
Index	– – –		"Replika" *Colour Index* and Supplement		934 16 6
Supplement	11 10 0	11 10 0	,, Stock 31st December 1950		
,, Printing and Binding			"Replika" *Colour Index*	626 14 8	
Index and Supplement		1,177 5 0	"Replika" *Colour Index* Supplement	134 17 4	761 12 0
,, Sundry Expenses					
Index and Supplement		29 7 9			
,, Surplus to Accumulated Funds		478 6 6			
		£1,696 8 6			£1,696 8 6

New Colour Index

EXPENDITURE	£ s. d.	£ s. d.	INCOME	£ s. d.	£ s. d.
To Expenses			By Balance to Accumulated Funds		1,030 19 1
Wages and National Insurance	182 0 4				
Hue Indication Charts	586 5 6				
Printing, Stationery, and Postages	128 16 9				
Meetings Expenses	8 10 9	905 13 4			
,, General Expenses					
Teas, Lunches, and Travelling	26 1 1				
Electrical Repairs	1 3 8				
Telephone	36 19 9				
Electricity and Heating	8 15 7				
Rent, Rates, and Insurance	41 5 8	114 5 9			
,, Depreciation on Office Furniture		11 0 0			
		£1,030 19 1			£1,030 19 1

Library

EXPENDITURE	£ s. d.	INCOME	£ s. d.
To Expenses	38 9 3	By Balance to Appropriation Account	41 9 3
,, Depreciation on Office Furniture	3 0 0		
	£41 9 3		£41 9 3

George Douglas Lecture Fund

Lecture Account

EXPENDITURE	£ s. d.	INCOME	£ s. d.
To Lecture Expenses	– – –	By Interest on Investments	59 10 2
,, Investment Charges (Midland Bank Executor & Trustee Co. Ltd.)	3 0 0		
,, Balance Transferred to Accumulations (Midland Bank No. 3) Account	56 10 2		
	£59 10 2		£59 10 2

Finance Committee— This Committee has met eight times during the year. The general costs of running the Society tend to increase, but all such expenditure has been carefully scrutinised and the increase for the year is small. On the other hand, it is gratifying to be able to report increased revenue, especially from the *Journal*, and an increased surplus on the year's working. Council is grateful to the advertisers for their ready acceptance of the changes in format which were introduced during the year and for their continued support.

In view of the very heavy expenditure which will arise in connection with the second edition of the *Colour Index*, the depreciation on the Society's long dated investments is a matter of some concern; it is therefore of first importance that any current investments should be free from risk of depreciation, and yet, at the same time, it is desirable that they should produce some income. It was for these reasons that, at an Extraordinary General Meeting held on 14th June 1950, amendments to the Bye-laws were made which rendered it permissible for the funds of the Society to be invested

in savings banks in addition to the usual trustee securities.

PUBLICATIONS COMMITTEE— This Committee has continued to be fully occupied during the year; there has been no reduction in the number of lectures and communications received for publication in the *Journal*, and the standard has been maintained on the same high level as in previous years. Although an effort has been made to limit the increasing number of abstracts to those of more immediate interest to the majority of members, while the innovation has been made of giving those of more specialised interest by title only, the total number of pages is still greater than in the largest pre-war volume, and, because of smaller type for the abstracts and wider measures throughout, the aggregate reading matter is considerably greater. Excessive delays in publication have now been largely overcome. The new cover for the monthly issues, introduced in January, gives the *Journal* a more dignified appearance, and has on the whole met with widespread approval.

The Society is indebted to all who have contributed to the production of the *Journal*, particularly the authors of papers, referees, abstractors, and Mr. C. O. Clark for editing the abstracts of patents.

The third impression of the photolithographic reproduction of the first edition of the *Colour Index* and Supplement, and the second impression of the second edition of *Identification of Dyes on Textile Fibres* by E. Clayton, have sold steadily during the past year. A second, revised edition of *Theory and Practice of Wool Dyeing* by C. L. Bird is at an advanced stage of production, and it is hoped to publish it early in the new year.

COLOUR INDEX SECOND EDITION— During the year, Dr. H. H. Hodgson joined the Editorial Panel; otherwise the position remains unchanged, and the members have had an active year.

Co-operation with the American Association of Textile Chemists and Colorists has continued on a cordial basis, and good progress has been made in the drawing up of the agreement between the Association and the Society; it is expected that this will be completed shortly.

The general progress has been rather slower than was hoped, but this is not perhaps surprising when it is realised that the amount of information is very large and comes from all over the world. The dyemakers have found it difficult to supply information at the rate at which the Panel would wish, but all are taking the keenest interest in the work, and it is hoped to have final information about the middle of 1951.

The preparation of the work for the printer is not likely to be completed until well into 1952, but preliminary discussions have taken place on a timetable for the printing, layout of the *Index*, and its cost.

Council records its indebtedness to the firms and institutions who have made it possible for members of the Panel to devote so much of their time to this work and to the members of the Panel who have given up much of their spare time.

DIPLOMA COMMITTEE— This Committee was set up by Council during the year, and has prepared a draft scheme for the award of diplomas in tinctorial technology, which has been approved by Council. It is now engaged in working out detailed syllabuses.

WORSHIPFUL COMPANY OF DYERS' RESEARCH MEDAL— Council is grateful to the Adjudication Committee for its work in reviewing papers published in the *Journal* from July 1949 to June 1950. Although the Committee has not felt able to recommend an award for this period, it emphasises in its report to the Council that the *Journal* contains many papers of high standard.

PRESIDENTIAL BADGE— Council learned with great pleasure early in the year that the Worshipful Company of Dyers was willing to present a Presidential Badge of Office to the Society, and set up a small committee to make detailed recommendations. Finally, a design by Mr. J. Chirnside, of the Manchester College of Technology, met with the wholehearted approval of both Council and the Court of the Company, and steps are now being taken to make the badge in accordance with this design. Council is extremely grateful for this and other evidence of the continued interest taken by the Company in the affairs of the Society.

SOCIETY'S MEDALS ADJUDICATION COMMITTEE— On the recommendation of the Committee, Council has awarded the Perkin Medal to Professor J. B. Speakman, Gold Medals to Dr. P. W. Cunliffe and to Mr. H. Foster, and a Bar to the Silver Medal to Mr. L. A. Lantz; the citations in respect of these awards appear in the January 1951 issue of the *Journal* (pp. 3 and 4). Council extends its warmest congratulations to the recipients.

WORSHIPFUL COMPANY OF FELTMAKERS' RESEARCH MEDAL— Both Council and the Adjudication Committee greatly regret that they still have to report that no paper suitable for the award has been published in the *Journal* during the period July 1949 to June 1950, and again express the earnest hope that work of a suitable nature will be published in the near future.

MERCER LECTURE— The Seventh Mercer Lecture on *Some Recent Developments in the Theory of Dyeing* was delivered by Dr. A. B. Meggy in Bradford on 28th April 1950. Members of other scientific bodies had been invited to attend, and the President was in the chair. The lecture was published in the October issue of the *Journal*, and constitutes an able review of the present status of the theory of dyeing.

The period of the Mercer lectures has now been extended for seven years, and Council is grateful to the anonymous donor for the further evidence of his interest in the affairs of the Society. A new Mercer Lecture Committee has been set up, and is now engaged on preparing a scheme of lectures and lecturers for this period. Arrangements have already been made for the Eighth Mercer Lecture to be given by Dr. D. Traill in Glasgow on 20th April 1951.

ANNUAL DINNER — The Sixty-sixth Annual Dinner was held at the Queens Hotel, Leeds, on 31st March 1950. The principal guest was Mr. W.

Crossley, Chairman of the Confederation of Textile Dyers and Finishers, and a large number of other distinguished guests, including Mr. W. L. Andrews, Editor of the *Yorkshire Post*, were present. The Gold Medal of the Society was presented to Dr. S. M. Neale.

FASTNESS TESTS CO-ORDINATING COMMITTEE— The work of the former Fastness Tests Committee has been reorganised, and a new co-ordinating committee has been set up. This is primarily concerned with policy and supervision of the work of a number of sub-committees, which deal with technical details. At present sub-committees are actively engaged in reviewing the tests for fastness to Alkaline Milling, Burnt Gas Fumes, Light, Perspiration, and Washing. Test specifications have been received via the B.S.I. from many overseas organisations, and a start has been made with comparing these as a first step towards preparing a draft international standard.

A second, revised edition of the Second Report of the Fastness Tests Committee has been published, and work has continued on the provision of bunches for light-fastness testing, B.S. 1006: Part 2, for sale by B.S.I.

VAT DYES COMMITTEE— This Committee concluded its discussions in February 1950, and after subjecting a range of vat dyes to the proposed test presented its report to Council. This was published in the October issue of the *Journal*.

WOOL DYES COMMITTEE— The report of this Committee was presented to Council in March 1950 and published in the April issue of the *Journal*. The Committee has since been dissolved, and Council is grateful to the members for their very useful work.

DYEING AFFINITY OF REGENERATED CELLULOSE COMMITTEE— This Committee has continued its work by way of contacts between its members and continued laboratory experimentation. Improvements have been made in the technique and apparatus for measuring dyeing affinity.

PRESERVATION OF HISTORICAL RECORDS COMMITTEE— The work of collecting items of historical interest has continued during the year. An outstanding donation is that of Mr. J. R. Hannay of all laboratory and other notebooks which he had acquired in the course of his working life.

TERMS AND DEFINITIONS COMMITTEE— The Committee has discussed the broad principles governing its work. It has put forward a tentative definition of "affinity", and is now occupied with the vexed problem of colour terminology.

PERKIN CENTENARY— A small committee has been set up by Council to consider the most suitable means of celebrating the centenary in 1956 of the discovery of Mauve by W. H. Perkin.

MOTH AND DERMESTID BEETLE PROOFING COMMITTEE— A considerable amount of experimental work has been carried on throughout the year on the larval test. The Larval Test Sub-committee believes that the various factors which render this test difficult of reproduction have been examined, and the stage is now reached when it is possible to draft a tentative test method.

SUMMER SCHOOL IN LEEDS— A second Summer School, sponsored by the Society, was held on 9–16th September 1950 in conjunction with the Extra Mural Department of the University of Leeds, the general theme being "The Theory and Practice of Dyeing".

Resident students, totalling 59 and including a number from overseas, were accommodated in Devonshire Hall, and 19 non-resident students also attended the school.

The school opened with an inaugural dinner, at which the President presided, the Guest of Honour being Dr. John Leese, who gave a most interesting address on general trends in education. There was an attendance of over 100, made up of students, chairmen of sections, lecturers, demonstrators, and members of the committee.

On the Sunday, an excursion to Bolton Abbey, Fountains Abbey, and Ripon was greatly enjoyed, especially by our overseas visitors.

The President took the chair at the opening lecture of the school, which was delivered by Professor Speakman, and the general plan was to devote the mornings to two lectures with discussion, while in the afternoons students visited works in the neighbourhood or carried out practical work in the Department of Colour Chemistry and Dyeing.

The school closed with the President's lecture entitled *Dyeing in Retrospect and Prospect*, which proved to be both interesting and stimulating and was greatly appreciated.

The Council is convinced that activities of this nature are of lasting value and of great benefit to members of the Society, and wishes to place on record its pleasure in the happy co-operation of the University of Leeds and its indebtedness to all those who in their various ways did so much to make the school a success.

SOCIETY OF DYERS AND COLOURISTS OF AUSTRALIA— Council again extends cordial greetings to the S.D.C. of Australia. It is pleased to note that the new South Australian Section has proved very enthusiastic, that the social and other activities of the Society have continued to flourish, and that the membership has increased by 50 to 356.

REPRESENTATIVES ON EXTERNAL BODIES — Council again wishes to express its gratitude for the work undertaken by the members who represent this Society on the external bodies listed on p. 347 of the July 1950 issue of the *Journal*.

During the past year the Society has been invited to be represented on the Applied Science Advisory Committee of the Royal Technical College, Salford (Mr. F. Farrington) and the Yorkshire Council for Further Education: County Advisory Committee for Textiles (Mr. A. Thomson).

The Society is greatly indebted to Mr. R. Conchar of Messrs. John Conchar & Co., Honorary Solicitors to the Society, who has given much of his time to considering any legal matters which have arisen. The Society is grateful also to Mr. J. V. Armstrong, Honorary Patent Agent, for providing informative articles on developments in patent law.

Council records its appreciation of the various donations which have been received during the year.

In this report it is only possible to touch upon the well recognised, normal activities of the Society and to record any notable happenings during the year. Other activities of the Society may be seen from the list of committees and representatives published in the July issue of the *Journal*.

Council wishes to thank all those members whose work for the Society is indicated in the records of its activities and the many who render services to the Society in other ways.

Finally, Council wishes to record its appreciation of the work of Dr. C. J. W. Hooper as General Secretary and Editor of the *Journal*, of Mr. E. Illingworth, who devotes much of his time to the finance of the Society, and of all members of the office staff, whose work is that of a loyal and happy team.

The Honorary Secretary (Mr. J. BARRITT), in moving the adoption of the Annual Report, which had been in members' hands for over a month, stated that, although the Society was in a flourishing condition, he was not satisfied that everything possible was being done to introduce new members. As the subscription had not been raised, the accompanying figures for the total amounts received each year as subscriptions showed that membership had approximately doubled since the end of the war, but that the annual increase was now tending to fall off rapidly.

1938	...	£2182	1946	...	£3034
1940	...	£2130	1947	...	£3951
1942	...	£1940	1948	...	£4400
1944	...	£2198	1949	...	£4604
1945	...	£2510	1950	...	£4699

It was especially important to bring in young members and encourage them to play an active part in the working of the Society.

The *Journal* had maintained a high standard, and the change in format had been generally commended. It had been possible to increase the revenue from advertisements, and the *Journal* as a whole now showed a surplus, probably for the first time in its history, which was a very striking result.

The Society's work on fastness tests was increasing, and close touch was being maintained with similar bodies on the Continent and in America; this international work would be discussed at a conference to be held in Bournemouth in June.

Mr. Barritt expressed his pleasure in working with Mr. Jennison, but pointed out that the Balance Sheet contained no item for the greatest asset of the Society, namely its goodwill. It was a never-ending joy to see members, firms, and institutions so very willing to give their services, and provided that spirit could be maintained and the membership increased, the Society could look forward to a successful future.

Mr. A. W. CARPENTER seconded the resolution, which was carried.

ANNUAL ACCOUNTS

The Honorary Treasurer (Mr. H. JENNISON), in submitting the Annual Balance Sheet, copies of which had been sent to members a month earlier, stated that the balance of Accumulated Funds was £20,877 compared with £18,645 at the end of 1949. Current liabilities were lower at £1714, while on the assets side debtors had increased from £2066 to £2856. Foundation Fund investments had increased by approximately £30 during 1950. The figure of £264 for cash at the bank showed that this was kept to the minimum for an adequate working balance. In the General Revenue Account, proportions of such overhead charges as rent and rates, lighting and heating, etc. had been allocated to the *Journal*, the new *Colour Index*, etc., instead of the whole amount being charged to the General Office as in previous years. In spite of this, the *Journal* had now become self-supporting, largely owing to the increase in advertisement revenue. The Society was again indebted to Messrs. Imperial Chemical Industries Ltd. for a donation of £100. The schedule of Development Account Investments showed that during 1950 £2000 had been deposited in the York County Savings Bank, as permitted by the amended Bye-law 47. In view of the generally satisfactory state of the Society's finances shown by the Statement of Accounts and Balance Sheet, Mr. Jennison had much pleasure in moving their adoption.

Mr. T. H. WOOD seconded the adoption of the Balance Sheet, which was carried.

RE-ELECTION OF PRESIDENT

Mr. J. BOULTON, in moving the re-election of Mr. Fred Scholefield as President of the Society, paid tribute to Mr. Scholefield's breadth of mind and clarity of statement and to his diplomatic handling of Council meetings. He was a distinguished teacher, and the Society would wish him well in his new post of Dyestuffs Adviser to the Board of Trade, though his leaving would be a great loss to the Manchester College of Technology.

Mr. FRED SMITH, in seconding the motion, expressed deep appreciation of Mr. Scholefield's work for the Society.

The resolution was carried with acclamation.

Mr. SCHOLEFIELD thanked the Society for his re-election and said that he was specially pleased that Mr. Boulton and Mr. Smith should have been associated with the motion, the former one of his earliest students at the College, which he was now leaving after twenty-five years. He assured the meeting that he would do his best for the Society.

ELECTION OF PRESIDENT-ELECT

Mr. SCHOLEFIELD, in moving the election as President-elect of Mr. H. H. Bowen, who had been nominated by Council, referred to Mr. Bowen's fine record of service to the Society, especially as Chairman of the Publications Committee for twenty-one years. His geniality was well known, and he had risen by his own efforts from a chemist at the bench to membership of the Board of Directors of possibly the largest dyeing organisation in the world.

Mr. E. A. Swift said he had great pleasure in seconding the motion, as he had known Mr. Bowen all his business life in Yorkshire. The nomination implied an honour to Mr. Bowen's firm, to which the Society was indebted for allowing members of their staff to spend so much time on the Society's affairs. The nomination had the full support of the West Riding Section and Committee.

The motion was carried with acclamation.

Mr. H. H. Bowen expressed his appreciation of the honour, and said he would do all he could for the Society to the best of his ability.

ELECTION OF VICE-PRESIDENTS AND ORDINARY MEMBERS OF COUNCIL

The Honorary Secretary stated that the scrutineers were satisfied that the ballot had been conducted in accordance with the Society's Bye-laws. A total of 517 ballot papers had been received, of which 35 had been spoilt, thus leaving 482 valid papers. The following, in alphabetical order, had headed the poll—

Vice-Presidents— Mr. W. A. Edwards, Mr. R. J. Hannay, Mr. E. A. Swift, Dr. H. A. Thomas, and Mr. G. M. Williams.

Ordinary Members of Council — Mr. D. Hanson, Mr. H. C. Olpin, Dr. C. B. Stevens, and Mr. H. A. Turner.

The President then declared the above persons elected, and wished them well in their offices.

VOTE OF THANKS TO SCRUTINEERS

A hearty vote of thanks to the scrutineers (Mr. J. V. Summersgill and Mr. E. Stead) for their arduous and responsible task was proposed by Mr. D. A. Derrett-Smith, seconded by Mr. F. Atack, and carried.

VOTE OF THANKS TO RETIRING VICE-PRESIDENTS AND ORDINARY MEMBERS OF COUNCIL

Dr. P. W. Cunliffe, in proposing a vote of thanks to retiring Vice-presidents and Ordinary Members of Council (viz. *Vice-presidents*— Mr. N. Hamer, Dr. H. H. Hodgson, Prof. J. B. Speakman, and Mr. F. M. Stevenson; *Ordinary Members of Council*— Mr. G. B. Angus, Mr. J. Boulton, Mr. C. O. Clark, and Mr. W. Penn), said that the healthy state of the Society was largely due to the great amount of work done by those serving on Council.

Mr. G. M. Williams seconded the motion, which was carried with acclamation.

Mr. Scholefield said he hoped that those now retiring would continue to work hard for the Society.

ELECTION OF HONORARY TREASURER AND HONORARY SECRETARY

Mr. Scholefield announced that, no other nominations having been received, Mr. H. Jennison and Mr. J. Barritt were re-elected Honorary Treasurer and Honorary Secretary respectively. This was received with loud acclamation.

ELECTION OF HONORARY SOLICITORS

Mr. H. Foster, in moving the re-election of Messrs. John Conchar & Co. as Honorary Solicitors to the Society, said that he had been surprised to observe in Mr. R. Conchar's office a Master Mariner's Certificate. No doubt it was for this reason that Mr. Conchar had steered the Society's legal affairs so well through troubled waters in recent years.

Mr. G. M. Williams seconded the motion, which was carried.

ELECTION OF HONORARY PATENT AGENT

Mr. N. Hamer, in moving a vote of thanks to Mr. J. V. Armstrong and the election of Mr. L. E. Jones as Honorary Patent Agent to the Society, said that the Society regretted that ill-health should have caused Mr. Armstrong to resign. Mr. L. E. Jones had already provided very useful summaries on patent legislation for the *Journal*, and would continue to serve the Society well.

Dr. R. L. Elliott seconded the motion, which was carried.

APPOINTMENT OF AUDITORS

Mr. H. Jennison, in moving the re-appointment of Messrs. Rawlinson, Greaves & Mitchell as Auditors to the Society, said he wished to pay tribute to the work of the Assistant Secretary, Mr. E. Illingworth, which had enabled the Auditors' charges to be reduced substantially.

Mr. H. Turner seconded the motion, which was carried.

AMENDMENT TO BYE-LAWS

Mr. H. Foster moved the following amendment to Bye-law 22—

The addition to the first paragraph of the words—

except as an Officer of the Society

He stated that the present wording of Bye-law 22 would prevent the election of an Ordinary Member of Council as Honorary Secretary or other officer of the Society. The purpose of the amendment was to remove this absurd anomaly.

Mr. F. Smith seconded the motion.

A member affirmed that the amendment should be opposed so long as the status of Vice-presidents and Ordinary Members of Council was practically the same.

After a lively discussion, in which many members took part, a vote was taken, and the motion supporting the amendment was lost.

VOTE OF THANKS TO CHAIRMAN

Mr. W. A. Edwards, in proposing a hearty vote of thanks to the President for his conduct of the meeting, extended a welcome to Mr. Scholefield on behalf of the Midlands Section.

The motion was carried with acclamation.

MR. G. E. HOLDEN

Dr. H. A. Thomas said that he had visited Mr. Holden a few days previously, when he had been asked to convey to the meeting Mr. Holden's wishes for its success and also that of the Society. Mr. Holden was looking forward to resuming his activities in the Society. It was unanimously resolved that the good wishes of the meeting be conveyed to Mr. Holden.

Annual Dinner

The Annual Dinner of the Society was held at the Grand Hotel, Leicester, on Friday evening, 30th March 1951, under the presidency of Mr. Fred Scholefield.

The principal guests were Dr. C. J. T. Cronshaw (*Prime Warden of the Worshipful Company of Dyers and a Past President of the Society*) and the Right Worshipful the Lord Mayor of Leicester, Alderman F. E. Oliver, T.D., D.L. Among other guests were Mr. A. W. West (*Master of the Worshipful Company of Feltmakers*), Mr. G. H. Spencer (*President of the Textile Institute*), Mr. S. Robson (*President of the Society of Chemical Industry*), Mr. H. A. R. Binney (*Director of the British Standards Institution*), Mr. J. Davidson Pratt (*Director and Secretary of the Association of British Chemical Manufacturers*), Mr. C. G. Hulse (*Secretary of the Dyestuffs Control, Board of Trade*), Dr. F. C. Toy (*Director of the British Cotton Industry Research Association*), Mr. J. Wilson (*Director of Research of the British Rayon Research Association*), Dr. D. Starkie (*Director of Research of the Hosiery Research Association*), Mr. J. C. MacCallum (*Director of Research of the Lace Research Association*), Professor J. B. Speakman (*Recipient of the Perkin Medal of the Society*), Mr. J. G. Evans and Mr. R. J. Hannay (*Vice-presidents*), Dr. P. W. Cunliffe and Mr. H. Foster (*Recipients of the Gold Medal of the Society*), Mr. L. A. Lantz (*Recipient of a Bar to the Silver Medal of the Society*), Dr. P. H. Hermans (*Director of the Institute for Cellulose Research, Utrecht*), Mr. W. L. Langton (*Chairman of the Midlands Section*), Mr. H. Boothroyd, Mr. G. Brearley, Mr. H. Clayton, Dr. F. J. Siddle, Mr. W. P. Walker, Mr. W. Whitwam, Mr. H. Wiles, and Mr. F. Yeoman.

The following officers of the Society were also present— Mr. H. H. Bowen (*President-elect*); Mr. W. A. Edwards, Mr. G. G. Hopkinson, Mr. J. M. Preston, Mr. E. A. Swift, Dr. H. A. Thomas, and Mr. G. M. Williams (*Vice-presidents*); Dr. R. L. Elliott, Mr. B. Kramrisch, Mr. W. Penn, Mr. F. Smith, Mr. A. Thomson, and Mr. G. S. J. White (*Ordinary Members of Council*); Mr. F. Atack, Mr. A. W. Carpenter, Mr. C. O. Clark, Mr. D. A. Derrett-Smith, Mr. A. S. Fern, Mr. D. B. F. McAndrew, Mr. J. Porter, Mr. R. L. Robinson, Mr. G. E. Styan, Mr. H. Turner, and Mr. C. C. Wilcock (*ex-officio Members of Council*); Mr. J. V. Summersgill (*Honorary Secretary of the Publications Committee*); Mr. H. Jennison (*Honorary Treasurer*); and Mr. J. Barritt (*Honorary Secretary*).

"THE SOCIETY OF DYERS AND COLOURISTS"

After the toast of "His Majesty the King", that of "The Society of Dyers and Colourists" was proposed by—

Dr. C. J. T. CRONSHAW (*Prime Warden of the Worshipful Company of Dyers*), who recalled that, on the last occasion on which the Society had held its Annual Dinner in Leicester, he had had the privilege of occupying the Presidential Chair for the first time. Sir Kenneth Lee had been present as Prime Warden of the Worshipful Company of Dyers. He remembered that occasion with great vividness because, owing to a misunderstanding with the then Secretary of the Society, he had believed that his predecessor, Mr. F. F. Flinn, would remain in office as President until after the Annual Dinner. In actual fact this was not so: the new President's first official duty is to preside at the Annual Dinner following the Annual Meeting. This might seem a fine point, but the fact remained that the Annual Dinner of a Society like ours is scarcely an appropriate occasion for a President newly in office to try out his ability as a completely extempore speaker.

Societies have had always two great needs that require to be satisfied in order that they may continue and prosper in their lawful occasions: money and the willing and devoted service of able and enthusiastic persons available to fill their official positions. In these times, out of the very nature of events, the problem of nourishing societies with adequate funds and enabling and ennobling the Society with adequate and inspired personal service had become more acute. In regard to money he could not conceive that this Society, with its fine technological record and its more than enthusiastic membership, would ever find lack of adequate funds a cramping circumstance. In regard to individuals there had been over the years no lack of quality nor of enthusiastic service. The President of the Society, Mr. Fred Scholefield, himself, with whose name the toast was coupled, was a sure token, out of his own individual accomplishments and in his character, that none of the needs of the Society should be lacking or neglected whilst he occupied the position of President. He had in earlier times made his own special contribution whilst working within the Industry, and had kept alight in the hurly burly of daily industrial affairs the flame of a technology illuminated by fundamental scientific knowledge and ideals. He knew that modern Industry persists and abides only by dint of its own inherent earning capacity. He had, by his own performance within the Dyeing and Finishing Industry, demonstrated the great enabling power that could and should reside in the hands and mind of the chemist.

Moreover, he had shown in the quieter and more cloistered atmosphere of the Manchester College of Technology the duty, when it lies in our grasp, to leave behind a heritage for our successors, and this in due time he would accomplish by reason of the vision and intellectual resource he had brought whilst at the College both to his teaching and to his research outlook.

No President in his own person could have satisfied so many of the criteria of what a President of this Society should be. He was a witty, a wise, and a fluent speaker, which is so to speak the icing and the decoration on the particular cake which every President, if he be worthy of the position, must inevitably present for our consumption and digestion.

Dr. Cronshaw said he had that night the honour of proposing the Toast to the Society in his capacity

of Prime Warden of the Worshipful Company of Dyers of the City of London. This Company of Dyers could trace its history back to the year 1188, and as far back as the year 1310 had been granted by the Lord Mayor of the City of London, with the assent of the Aldermen of that City, powers of self-regulation to the Dyers Craftsmen. There was, then, a peculiar and fitting circumstance in the fact that the toast of the Society of Dyers and Colourists was being commended on behalf of the ancient craft and mystery of dyers. Now, no one set of dyers would ever deceive or mislead another set of dyers, so that everyone present could drink to this toast cordially and without any reservations whatever. The craft of dyeing was, of course, more venerable than the Company of Dyers, and went back even beyond Biblical times. The records of the Company of Dyers over the last 850 years quite often refer to the skill of the good dyer and lack of skill of the bad dyer, from which we might assume that complaints from customers is a practice that has beset the dyer from the earliest days.

The dyer's art has over the years become more and more dependent upon the skill of the chemist and the physicist, and yet, whilst a greater certainty of result is now to hand, nevertheless the art of the dyer still remains. No observant person beholding the galaxy of shade and design that arises from this process of dyeing and textile printing could believe that the technology which makes all this possible could be other than a close alliance of art with science. It was this particular and special blend of an art, a science, and a technology which the Society of Dyers and Colourists had the primary duty to nourish, to foster, and to develop. Evidence that the Society did this with success was contained in the series of volumes of the *Journal*, and evidence more striking lay in the variety and beauty of the fabrics produced by the Textile Industry in this country, which, despite some of the unkind remarks made about it from time to time, was still, in skill and accomplishment, the greatest Textile Industry in the world.

A special attraction in the invitation to propose this toast was that some opportunity was thereby offered to say something about science and technology to an audience of informed and influential people, to comment in a privileged way upon certain matters of moment in regard to both these subjects. There was still a tendency to regard science and technology as completely separate human endeavours. True, a relativity between them was always taken for granted, but this notion of separateness was a harmful affair. First of all, it created a frontier, and everyone knew that frontiers, whether between peoples, geographical territories, or branches of human endeavour, by their nature erect obstacles to free passage, whether mental or physical, between the adjacent domains. Frontiers begin their existence as simple boundaries and end up by becoming barriers. Science and technology are not really distinct and separate; they are fundamentally indivisible except for the simple purpose of mere convenient classification. In the fargone days, science and technology were the same thing. John Mercer was a scientist and he was also a calico printer. He was, moreover, a Fellow of the Royal Society, but Dr. Cronshaw's guess was that Mercer's greatest pride was as a calico printer. It would be difficult at any period to separate the science of organic chemistry from the technology of the dye industry; in point of fact they grew up together and each created the other. The first dye technologist was Sir William Henry Perkin. He was also a scientist judged by any standard. One could say with truth that the decay of the Dye Industry in this country followed upon the attempt to separate the technology from the science.

Another example was the science of polymer chemistry and the technology of plastics and synthetic fibres.

Perhaps the greatest danger which arises from an attempt to separate the two—science and technology—is that one seems thereby to lessen technology; to imply, perhaps, that its practitioners need a less fundamental training, seemingly a lower degree of intellectual equipment, perhaps a less rigorous mental discipline; that research is a profession for the scientist, and that experimentation will suffice for the technologist.

We should have nothing to do with this notion of arbitrary division in this matter. The truth is that the first-class technologist must be a first-class scientist, so that we should keep the parts together and have the great and beneficial leavening effect that results from regarding them as indivisible.

According to a leading article in the *Observer* [24th March 1951] under the heading "Leadership in Science", Britain had never lost the leadership in science; the difficulties lay in the linking up of the laboratory with the factory, and in training the technologists—the technically skilled scientists—whose task this is. This was quite true, but it was regrettable that in the writer's mind they were a separate affair. Actually, the only method of training technologists is to train scientists and then let them be engaged within industry. Only within industry itself can scientists have the opportunity to become technologists; they cannot be deliberately and formally trained as such in any other place. There is within industry a potent directive force towards novel things which can only be experienced by dint of having our work and being within an industry. You must, so to speak, let the dog see the rabbit.

The article went on to say that Britain was weak in the pilot-plant stage, which covers the trying-out of new inventions and the application of scientific knowledge to industrial processes. From this it appeared that the sole task of industry was to apply scientific knowledge, but industry should not be let off so lightly. Surely industry had also, of itself and arising out of its own needs, to create scientific knowledge. It must, to succeed in its own task, both utilise and add to scientific knowledge.

Since we were speaking about this "pilot plant stage", it was worth while remarking that since 1938—a period of thirteen years—this country of ours had been either engaged in preparing for war, actually bitterly and comprehensively engaged in war, or engaged in repairing the ravages of an

intensely war-damaged economy. All this had entailed a lack of the enabling circumstances which bring new and novel methods and products to function— shortages of skilled craftsmen; scientifically trained people— of chemists, of engineers, physicists, biologists, and the like; lack of physical materials— bricks, steel, copper, cotton, timber. In other places also were the facilities cramped. For example, we had crowded universities in which to train our scientists, and now we were threatened by a shortage of teachers of science in our schools.

If it takes, for example, two years to design and erect a pilot plant, when in other places—particularly the U.S.A.— it can be done in, say, half the time, we are liable to be out of date before we have an opportunity to start to solve the problems.

The problem we have in this country is that of catching up with time— a melancholy task in a fast-moving and progressive technological era. But there are, in this affair, a number of factors which it is fair to believe should encourage and hearten us in this task of catching up with time.

As a people we reveal our greatest strength and capacity in a period of stress and adversity. We are, by the record of history, a people of great individual skill and resource.

In this country we have societies, such as your own Society, that are equipped with the means to publish and disseminate new knowledge as it is newly acquired; able to encourage the pursuit of new knowledge and new processes and to foster the unity of science and technology.

Mr. Fred Scholefield (*President of the Society*), in responding to the toast, thanked Dr. Cronshaw for his kind remarks. He felt it most appropriate that Dr. Cronshaw should propose this toast, as he had been President of the Society from 1939 to 1946 and was now Prime Warden of the Worshipful Company of Dyers and President of the British Colour Council— in the last capacity he no doubt had the delightful task of selecting those seasonal hues and those picturesque names for which that body was famed.

The new Fastness Tests Co-ordinating Committee was continuing the Society's work on fastness tests through the agency of various technical subcommittees. It was endeavouring to secure international standardisation of such tests by close co-operation with Continental and other overseas countries The Society and the American Association of Textile Chemists and Colorists acted as technical advisers to the joint Anglo-American Secretariat of the Subcommittee of the International Standards Organisation dealing with Colour Fastness, and at a meeting to be held in Bournemouth it was hoped to secure a wide measure of agreement

Thanks to the co-operation of dyemakers and dye-users, the preparations for the publication of the second edition of the *Colour Index* were going ahead, and the Society's relations with the A.A.T.C.C. continued to be extremely cordial.

The high level of the *Journal* was maintained by the high quality of the papers submitted, the work of the Publications Committee, and the patience of the Editor.

The finances of the Society could be regarded as remarkably good, especially when it was considered that the annual subscription had not been increased since before the war. Mr. Jennison's sentiments, in his capacity as Honorary Treasurer, could be aptly described by the two lines of Hilaire Belloc—

> I'm tired of love, I'm still more tired of rhyme,
> But money gives me pleasure all the time.

The leading article in the *Observer*, mentioned by Dr. Cronshaw, had referred to two outstanding events in the country's history— the reform of the Navy by Samuel Pepys and the foundation of the Royal Society, of which Pepys was an early member, under the patronage of Charles II in 1662— and by a curious error it placed them in the second half of the eighteenth instead of the seventeenth century.

The *Observer* attributed the rise of Britain to the extraordinary position of power and prosperity which this small island eventually gained, in part to these two events: without the Royal Navy she could not have developed her mercantile empire; she could not have become the dominant industrial country if she had neglected science.

That other famous diarist John Evelyn, who was later to become Secretary of the Royal Society, had recorded that—

> The King gave us the armes of England to be borne in a canton in our armes, and sent us a mace of silver gilt of the same fashion and bigness as those carried before his Majesty, to be borne before our President on meeting days.

Pepys told us that his friend Dr. Clarke offered in 1662 "to bring me into the College of virtuosoes". It was the same Dr. Clarke of whom he wrote—

> The Doctor and I lay together at Wiard's, the chyrurgeon's in Portsmouth, his wife a very pretty woman. We lay very well and merrily: in the morning, concluding him to be of the eldest blood and house of the Clerks, because that all the fleas came to him and not to me.

Pepys was Master of the Clothworkers' Company in 1676, and in 1684 was elected to the high office of President of the Royal Society: his predecessor in 1680 had been "that excellent person and great philosopher Mr. Robert Boyle".

Britain, said the *Observer*, had never lost her leadership in pure science, but there was a great deal more we could do in linking up the laboratory with the factory, and in training the technologists, the technically skilled scientists, whose task this was. Five or six years ago, the Percy Report had made the same point— the position of Britain as a leading industrial nation was being endangered by a failure to secure the fullest possible application of science to industry, and this failure was partly due to failures in education—

> In particular . . . . . the greatest deficiency in British Industry is the shortage of scientists and technologists who can also administer and organise, and can apply the results of research to development.

This kind of thing was not new; it had been the theme of several of the speeches at the inaugural meeting of the Society nearly seventy years ago.

Because of his own training, experience, knowledge, and achievement, Dr. Cronshaw was

eminently qualified to express an opinion on the best systems of training for our scientists and technologists, and his emphasis on the importance of science as a preliminary to industrial experience was no doubt justified. There might, however, be alternative methods not less appropriate in the particular circumstances.

The following extract from the Report of the Committee on Educational Survey to the Faculty of the Massachusetts Institute of Technology was of interest—

> We conclude that William Barton Roger's original concepts of higher education with a scientific and technical basis, of learning by doing, and of the value of an integrated professional and liberal education are important guiding principles relevant to our educational planning to-day.
>
> Undergraduate education in a technological school has two objectives—the professional and the general. The professional objective is to prepare a man for a certain kind of work in Society. The general objective is to develop the character traits, the intellectual habits and skills, and the understanding of nature and man that an educated person should have, regardless of the kind of work he does.
>
> We conclude that M.I.T. should continue to offer a strong undergraduate program, and that for most courses it should be limited to four years.
>
> Our faith in the concept of undergraduate professional education rests in the conviction that the subjects of study and the methods of teaching characteristic of a technological curriculum have a general as well as a professional educational value.
>
> It is enough to orient a young man in a broad field in which he has shown some interest or talent, to give him a mastery of fundamental principles, and to impart the spirit and the vocabulary of a profession. In the fields of science and technology, this sort of preparation for a career should normally begin in the undergraduate years.
>
> Most of the distinguished leaders in technology and business that M.I.T. has produced have had this kind of education . . . . . We believe that a large share of the future leaders will be chosen from this group whose formal professional education ends with the bachelor's degree.

The latest proposal to remedy our own technological inferiority was contained in a recent Government Report of the National Advisory Committee on Education for Industry and Commerce, which stated—

> The fundamental problem in technical education is the training of men with first-class ability to fill to the best advantage the varied technological parts in the spheres of production, invention, design, research, and management in industry, and the adaptation of the present educational framework to meet the needs of industry and the individual to the full.

The outstanding change recommended by the Advisory Committee was the establishment of a Royal Institute of Technology, the principal function of which would be to raise the standard of teaching and research in our technical colleges. With the new Royal Institute our Society would seek the closest co-operation.

PRESENTATION OF PRESIDENTIAL BADGE

Dr. CRONSHAW said that the close association between the Company and the Society dated from 1908, when the research medal had been instituted. Recently Mr. G. E. Holden had suggested that the Society should have a presidential badge, and it now gave him (Dr. Cronshaw) special pleasure to present, in the name of the Prime Warden, Renter Warden, Court of Assistance, and Livery of the Worshipful Company of Dyers, a presidential badge of office to the Society.

Mr. SCHOLEFIELD said that he had very great pride in accepting the gift, a beautiful work of art, representing both the science and the art of dyeing, designed by Mr. J. Chirnside. He expressed both his own and the Society's thanks for the Company's generosity. (*See accompanying illustration.*)

CONFERMENT OF HONORARY MEMBERSHIP ON MR. G. E. HOLDEN

Mr. R. J. HANNAY (*Chairman of the Manchester Section*) said that it was an honour and a pleasure to perform the task allotted to him, though the pleasure was restricted to a certain extent by the unavoidable absence, due to illness, of the man on whom the Society that day conferred its highest mark of distinction, and he was sure that all present would desire their best wishes for a speedy return to health and strength to be conveyed to Mr. Holden.

George Edward Holden joined the Society as an Associate in 1901, and was transferred to Ordinary Membership in 1908. It was perhaps appropriate that in 1951, after a 50 years' connection with the Society, we should be recognising in a tangible form his sterling work for our aims and objects. During those years he had been a stalwart supporter of the Society in all its activities, serving at various times as Section Committee Member, Section Chairman, Member of Council and of various Committees, Vice-president, and in 1948–1950 President.

In addition he had been a contributor to the *Journal*, being the author of some twelve papers of no mean merit. One of the services for which the Society owed him a particular debt of gratitude was the steady and quiet way in which he had fostered and increased the contact between the Society and the Worshipful Company of Dyers, of which guild he had been Prime Warden in 1940–1941, work which the principal guest that evening, himself the present Prime Warden and a Past President of the Society, was continuing with unabated zeal.

So much for the services of Mr. Holden to the Society. What of the man himself? He was a Northerner and a Lancastrian, with that touch of dry wit and humour typical of the County Palatine, kindly and considerate in disposition, and ever ready to do a good turn to those who needed and deserved it. During the years of service to the Society and to other bodies he had never sought distinction or honour; on the contrary, on several occasions he had declined reward so that others, who in his opinion had been more deserving, might have it. Such was the man they honoured that evening, by adding his name to that select number of distinguished and honourable men who were Honorary Members of the Society.

Finally, Mr. Hannay said that he presented George Edward Holden, C.B.E., M.Sc.Tech., F.R.I.C., unfortunately in his absence, to receive the Honorary Membership of the Society of Dyers and Colourists, firstly for his services to the Society, for, in a phrase taken from one of the Collects in the Book of Common Prayer, "true and laudable

Presidential Badge

presented to the

Society of Dyers and Colourists

by the

Worshipful Company of Dyers
of the City of London

1951

J.S.D.C. **67** (June 1951)
Facing p. 220

THE design attempts to combine, in symbolic form, the two aspects of the work of the dyer and colourist— the craft aspect, which is largely traditional; and the modern developments in synthetic dyes and dyeing methods, which are the result of scientific research.

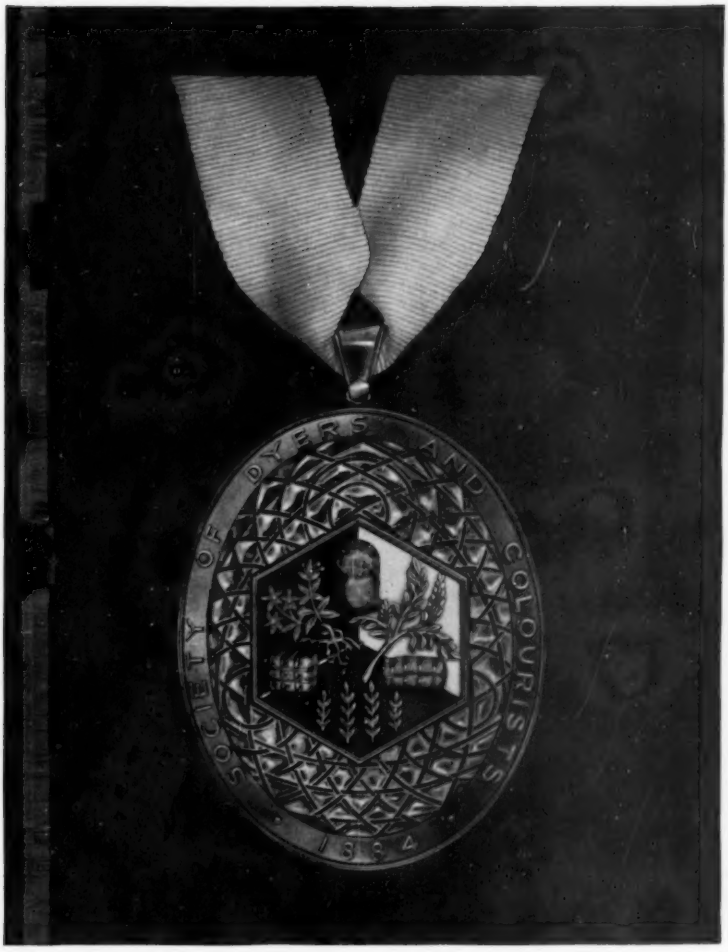
The method employed to combine these two aspects without discordancy in the same design has been to separate the craft and science symbols by the use of the centre hexagonal frame, which in itself symbolises chemical developments in dyes and filaments. The craft symbols are placed as charges in the traditional manner within this frame.

The elliptical shape of the badge is felt to be a satisfactory one, as it suggests the suspension of the badge from the white silk ribbon (signifying white light), and it provides, in addition, scope for the pleasant disposal of the necessary lettering without distortion. The edge has a narrow rim raised sufficiently to protect the surface of the lettering and enamel. The elliptical framework with its lettering encloses a pattern of interlacing wave-forms representing the three primary colours of the physicist, the dimensions of the waves standing in the same ratios to each other as those of the three primary additive colours— red, green, and blue. The ridges or crests of the waves are outlined in enamel in the appropriate colours. The centres of these three primary colour wave-forms are placed at equal distances apart, making a strong triangular basis to the other symbolic features.

The hexagon is constructed upon the triangle thus formed, and encloses within its frame three lozenges of colour which act as background to the charges. The colours so formed are the subtractive primary colours used by the artist and dyer— magenta, blue-green, and yellow. They are placed between their respective component parts in light, i.e. the yellow lozenge is between the red and green centres, the magenta between the red and blue, and the blue-green between the blue and green. This provides an interaction between the pattern of the outside and inside of the hexagonal frame and thereby unifies the design. It has the further advantage of providing a rich coloured background for the traditional craft charges.

The charges on this three-coloured background are the traditional craft symbols— namely, the woolsack, the bale of cotton, and the fardel of silk, symbolising the principal natural fibres: these charges are alternated with three symbols of the traditional dyes— Madder, Indigo, and the Grain-tree. These six decorative and symbolic figures are simply and massively modelled in fairly full relief in gold, the contour of each object being emphasised by the coloured background. It will be noted that a further triangular symmetry is formed by the dispositions of the three material symbols and the three traditional dye symbols: an equilateral triangle with its base across the magenta and yellow segments and its apex pointing downwards is given by the floral objects, and this triangle rests upon the upright triangle of the material symbols. The unity of the whole design is therefore dependent upon a system of triangles which has, as its theme, the division of white light into three equal parts, these parts producing spectrum colours and being related, again by the use of triangles, to the materials used by the dyer and colourist.

JOHN CHIRNSIDE



Presidential Badge presented to the Society of Dyers and Colourists
by the
Worshipful Company of Dyers of the City of London
1951

service", and secondly as an old and esteemed member whom they all respected and honoured, in the words of Tennyson in his prologue to the *Idylls of the King*—

> We see him now as he moved
> How modest, kindly, all accomplished, wise,
> With what sublime repression of himself
> And in what limits, and how tenderly;
> Not making his high place the lawless perch
> Of winged ambitions, nor a vantage ground for pleasure.

PRESENTATION OF THE PERKIN MEDAL TO PROFESSOR J. B. SPEAKMAN

Mr. J. G. Evans (*a Vice-president of the Society*), in presenting Professor Speakman, said that, wherever wool was grown or sold, spun or woven, knitted, dyed, or finished, its science was associated with the name of one man, John Bamber Speakman. For it was he, and virtually he alone, who had converted a textile craft into an applied science.

Some thirty years ago he had been appointed Lecturer in Textile Chemistry in the Department of Textile Industries at Leeds University— an act all the more courageous and praiseworthy when it was recollected that he had no textile background, no textile experience. Indeed much of what he had done before had gone up in smoke, for he had been associated with Professor Whitelaw Gray in a detailed study of that commodity. But that had in no wise clouded or befogged the mind that he brought to bear on textiles in general and wool in particular.

Clear of thought and incisive of purpose, he at once perceived that to launch a frontal attack on the wool citadel would be but to follow in the footsteps of others and to court failure. He therefore adopted the oblique approach, novel in concept, simple in execution, namely that of studying and relating mechanical properties to physical and chemical constitution. Such unorthodoxy received in full measure the blast of criticism which he had expected, but, tenacious of purpose, he continued to forge the tools with which he was to lay bare the structure of wool to its very backbone.

It would be idle to pretend to recount the many papers which emanated from the eminent research school that he founded, but as each succeeded the other so the unfolding picture of the wool structure became increasingly clear. Among his many fundamental discoveries, the concept of the salt link might be chosen not only for its own sake but for the inspiration it had been to others. One of his most notable achievements had been the provision of working hypotheses to explain the behaviour of wool in ordinary processing and, that which was the very hallmark of all sound research, the ability to forecast the reaction of wool to a new set of circumstances, providing predictions which he himself had so often brilliantly verified. In all this, the many papers which he had presented had reflected his own fecundity of ideas and been a constant stimulus and inspiration to others.

Outstanding as the fundamental discoveries were, he well knew that the accumulation of knowledge for its own sake alone was inimical to the best interests of research, and he set about applying the knowledge o the everyday processes of wool treatment. Oiling and scouring, setting and milling, potting and crabbing, dyeing and finishing generally came within his scope, on all of which he shed new light. That he was versatile and above the material was shown by the fact that the glory of many a woman's hair and its undulating charm owed much to what John Bamber Speakman set out to do.

There could be no outstanding leader of research teams who had not, in no small measure, some of the more benign of human qualities. The medallist had a keen sense of humour and especially an even keener sense of appreciation of humour in others. Skilful in argument, trenchant in debate, yet wisely tolerant of the views of his most junior worker. Above all, a readiness to share his knowledge with all who cared to seek it. No textile community was too small or too lowly to be denied his lucidity of exposition or his masterly marshalling of facts. In all this he had won for himself, his university, indeed the nation to which he was proud to belong, the respect, the admiration, nay the envy of the textile communities of the world.

Never had Yorkshire received so much at the hands of a Lancastrian, nor a Lancastrian been deemed so worthy of being a Yorkshireman.

For these and many other cogent reasons, Mr. Evans commended John Bamber Speakman, D.Sc., F.R.I.C., F.T.I., Professor of Textile Industries in the University of Leeds, as a most worthy recipient of the Perkin Medal.

Professor J. B. Speakman, in reply, expressed his appreciation of the high honour conferred upon him by the Society, and of the very generous references to his work by Mr. Evans.

"OUR GUESTS"

Mr. W. L. Langton (*Chairman of the Midlands Section*), in proposing the toast of "Our Guests", said that, while there were a few occasions on which one or two people liked to celebrate alone, a function such as that would be incomplete without their guests. They lent proportion and perspective to the gathering, and (to quote W. S. Gilbert) gave artistic verisimilitude to an otherwise bald and unconvincing narrative; nothing else could quite form a substitute.

When the history of this half-century came to be written, the recorder could not but observe that it had been an age of substitutes. We were by now resigned to the use of something else, because what we wanted was not available. What once had been considered to be essentials were often now but figments of lively imaginations and long memories. The roast beef of old England had long since been replaced by the stewing beef of old Argentine, which latter had now yielded pride of place to the pressure-cooked reindeer of Greenland's icy mountains. Our next purchase would be from India's coral strand. W. S. Gilbert had propounded half-a-century ago, with the assistance of Sir Arthur Sullivan, a political thesis entitled *Iolanthe*, in which he had laid down that—

> Every boy and every gal that's born into this world alive,
> Is either a little Liberal or else a little Conservative.

Few would not have observed that substitution had taken place there.

Fortunately, there were no substitutes for guests, so that their presence that evening had honoured us and given us pleasure. The President had already expressed our happiness and gratitude to Dr. Cronshaw.

We were glad to have with us the Master of the Worshipful Company of Feltmakers, Mr. A. W. West. The Company had shown its interest in the Society by its offer to provide a medal for a paper on a subject related to the art of feltmaking. To our regret the medal had not yet been awarded, but it was expected that papers of adequate standard would be forthcoming in due course.

Our Society was dependent on the chemical industry for many of its materials, and our relations with the Society of Chemical Industry had always been close and cordial. That Society had been founded a few years before ours, and we had had three presidents who had been presidents of that body— Sir W. H. Perkin, in whose memory the Society's Perkin Medal is awarded at intervals, as to-night; Raphael Meldola, who was actually president of both organisations at the same time; and, in more recent times, Dr. H. Levinstein, a good friend of the Society, and a past Prime Warden of the Worshipful Company of Dyers. The present President of the Society of Chemical Industry, Mr. S. Robson, had had a distinguished academic and industrial career, and during it he had spent a few years in the dye industry. He had rendered much valuable public service, in particular to the Ministry of Supply and the Department of Scientific and Industrial Research. He had had a lifetime's experience in the manufacture of sulphuric acid, and it would be very helpful to the textile industry if he could devise means of augmenting the supply of that commodity.

We were delighted to be able to include Mr. George Spencer in our company, and the Textile Institute were to be congratulated on having that stalwart son of the Midlands as their President. The Institute and our Society worked together in close harmony on a very friendly basis. We also had with us Mr. H. A. R. Binney, Director of the British Standards Institution. Of recent years the work on fastness tests had made for even closer contact than before, and it was hoped that this work would develop internationally through the International Standards Organisation, a meeting of which would take place later in the year, when colour fastness would be discussed. Mr. Binney had recently become Director of the B.S.I., and the Society wished him well in his responsible office.

We welcomed, too, the Directors of Research Associations and were grateful for the support they gave the Society in various ways. The Director of the youngest research association, Mr. J. C. MacCallum of the Lace Research Association, was present, and the Society wished him well with its early development.

The textile industries appreciated the work of the Association of British Chemical Manufacturers and its energetic Director and Secretary, Mr. J. Davidson Pratt, and truly could it be said that the dyemakers as a whole had rendered great service to the country. The relations of the Society with all the dyemakers were of the happiest, and the latter were responding nobly to the calls we made on them in connection with the second edition of the *Colour Index*. At times they might feel inclined to curse our questionnaires, but, along with dye-users throughout the world, we hoped to live to bless our joint efforts. We were always glad to have Mr. C. G. Hulse from the Board of Trade Dyestuffs Control with us, and felt sure that his happy personality contributed to the successful working of the Dyestuffs Control Act.

Dr. P. H. Hermans, of the Institute for Cellulose Research, Utrecht, Holland, was a distinguished foreign guest whom we were delighted to welcome to our company.

There were to have been other guests, who were unavoidably absent, and we greatly regretted that they could not be with us.

Mr. Langton expressed the pleasure of the Midlands Section at the decision to hold the A.G.M. and Dinner in Leicester, and at the opportunity thus afforded to many members of the Society to visit the Midlands. It was a particular pleasure and honour to have present the Right Worshipful the Lord Mayor of Leicester, Alderman F. E. Oliver: the chief citizen of an ancient and honourable city, with its roots deep in the past, which, in spite of its motto *Semper Eadem*, was a very go-ahead organisation with the reputation of being the cleanest and wealthiest city in the Empire. It completely confounded Northerners who have the adage, "Where there's muck there's money". Leicester was a musical city, it had a vigorous textile community and nearly the highest prison walls in the country— there might or might not be any connection between the last two observations. Whether or not the Lord Mayor had had contact with the dyeing profession, he would no doubt be familiar with the quotation from G. W. E. Russell's *Collections and Recollections*, about the mayor who said that, during his year of office, he would lay aside all his political prepossessions and be "like Cæsar's wife" all things to all men. Finally, Mr. Langton congratulated the Lord Mayor on Leicester's success in reducing its rates, and thanked him for gracing our Annual Dinner with his presence, which was deeply appreciated.

The Right Worshipful the Lord Mayor of Leicester, Alderman F. E. Oliver, in responding to the toast said that he was glad to welcome members of the Society to Leicester. The city was proud of being one of the cleanest of industrial towns, and he took especial pride in the fact that they had recently been able to reduce the rates by sixpence, without any corresponding reduction in services, when most other towns in the country were having to increase their rates. In front of such a company well versed in chemistry, he could only express his regret that his knowledge of the subject consisted of nothing but memories of smells and bangs from his schooldays. He himself was in the boot and shoe trade, and his chief contact with the art of dyeing involved shoes which were, according to his customers, of the wrong colour. He was grateful for the opportunity of thanking the Society on his own behalf and that of the other guests for its hospitality.

Recent Trends in the Search for New Azo Dyes
IV—Azoic Dyes

D. A. W. Adams

Meeting of the Leeds Junior Branch held at the University of Leeds on 28th November 1950, Mr. C. L. Bird in the chair

Introduction

In describing recent trends in azoic dyes, it is essential to relate the newer developments with the earlier established products, so that, although it is intended to discuss mainly developments since the reviews given by the late Prof. F. M. Rowe[1,2] and the summary by M. Lapworth in Thorpe's Dictionary[3], it will obviously be necessary, in order to give a coherent story, to refer to some of the products there described. Real advances in the years since the war are few, and much of the paper will relate to discoveries made or products introduced just before the beginning of the war.

The production of insoluble azo dyes on the fibre by padding cotton with an alkaline solution of a coupling component and then treating with a diazo component was first patented by T. and R. Holliday of Read, Holliday Ltd. in 1880[4]. β-Naphthol was used as the padding component and α- and β-naphthylamines and later *p*-nitroaniline as diazo components. The German firms saw the possibilities of this process, and a big step forward was made by the Griesheim-Elektron A.-G. in 1912 by the introduction of Naphtol AS, the anilide of 2:3-hydroxynaphthoic acid[5]. This had the advantages over β-naphthol that its sodium salt possessed some affinity for cotton and that it gave dyeings which were much faster to both light and washing.

Further progress was slow until 1922, when Naphtol AS was followed by a very large number of other coupling components and also by numerous new diazo components, all designed to give dyeings with improved fastness properties or to extend the hue range beyond the scarlets, reds, and bordeaux given by the original combinations. Of great importance to the user, too, was the introduction of stabilised diazo compounds (Fast Salts), relieving the dyer of the necessity of carrying out his own diazotisations, and, for printing purposes, of mixtures of stabilised diazo compounds and coupling components (Rapid Fasts and Rapidogens (IG), Brentamine Rapids and Brentogens (ICI)).

The I.G. Farbenindustrie A.-G. were pre-eminent in these developments, and the reason is not far to seek. Between 1922 and 1930 they built up an almost impregnable position by their numerous selection patents designed to extend the life of their original patent for Naphtol AS; although this virtual monopoly was partly broken by the successful judgment for Imperial Chemical Industries Ltd. in the big I.G.–I.C.I. patent litigation of 1929–1930[6], they were still able, because of their vast accumulated experience, to keep ahead of all other entrants into this field. Some idea of the research effort expended to maintain this position is clear from information obtained by investigating teams in Germany in 1945 and 1946. Thus the minutes of the Naphtol AS Committee (an inter-factory committee comprising heads of all the main departments of the I.G. concerned with azoic products) for the meeting held on 8–9th July 1938[7] state that, in the eight years, 1930–1938, during which the committee had been in existence, there had been introduced 13 new Naphtols, 33 new diazo components, and 55 new printing compositions. These had resulted from the preparation and examination during this period of 4022 new coupling components and 5905 new bases. In 1939, according to a statement made by Dr. Zitscher[8], there were twenty-two chemists carrying out research in this field, although by 1941, because of war conditions, this number had fallen to five.

Azoic Coupling Components

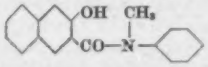
The majority of coupling components required to give oranges, scarlets, reds, bordeaux, violets, and blues are arylides of 2:3-hydroxynaphthoic acid; to obtain bright yellows, browns, blacks, greens, etc., however, recourse has had to be made to arylides of aliphatic ketocarboxylic acids or to other aromatic *o*-hydroxycarboxylic acids. The Naphtol (IG) and Brenthol (ICI) ranges alone include seventeen red-producing types, all derivatives of 2:3-hydroxynaphthoic acid. This large number is necessary to cover the various requirements of the trade. For dyeing purposes, especially machine dyeing, products of high substantivity are required, whereas for printing purposes, where the component is padded, low substantivity is preferred, so that the undeveloped component can be soaped off easily, leaving good clear whites; again, for admixture with stable diazo compounds to give printing compositions good solubility is the main criterion. For some trades, where maximum fastness is not required, the cheaper simple components are desired; whereas when high fastness to kier-boiling and bleaching is required, the more complex, and therefore more expensive, components must be used.

SUBSTANTIVITY

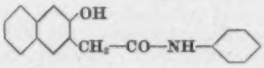
One of the most important properties of arylides of 2:3-hydroxynaphthoic and other *o*-hydroxycarboxylic acids is the affinity of their salts for vegetable fibres. Although they all possess some degree of substantivity, there are wide variations; thus the red-producing components range from Naphtol AS, which has a substantivity of about 12%, to Naphtol AS–S (the 2:3-hydroxynaphthoic

arylide of 2-amino-3-methoxydibenzofuran), which has a substantivity of about 75%. A high substantivity, as mentioned above, is particularly important in machine dyeing and where ultimately a high fastness to rubbing is desired. The factors affecting substantivity in these components have therefore received considerable attention.

Schirm[9] in 1935 suggested that the substantivity of hydroxynaphthoic arylides was due to the amide group, this being present in the iminol form –C(OH)·N–. This is supported by the absence of substantivity when the NH is substituted, as in—

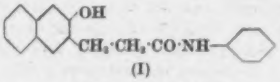


Krzikalla and Eistert[10] showed that an iminolisable grouping alone was not sufficient to give substantivity, and that it must be so placed in the molecule that it can form a bridge between the conjugated double bonds of the naphthalene ring and those of the arylide ring. They showed for instance that—

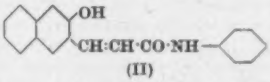


had very low affinity.

Luce[11] of the I.G. extended this work and showed that, whereas I (below) had very low substantivity, the conjugated unsaturated compound (II) had higher substantivity than Naphtol AS itself.

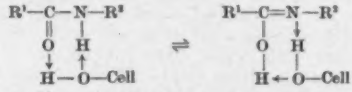


(I)

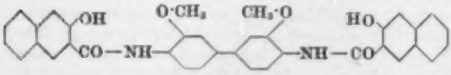


(II)

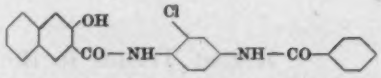
Luce also tried to confirm the iminolic form of the Naphtols by attempting to make a di-salt, but this he failed to do. He therefore considered that hydrogen bonding occurs with the hydroxyl groups of the cellulose, thus—



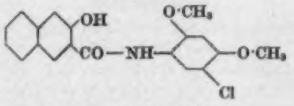
Hodgson[12] explains the relatively high substantivity of Brenthol BN (2:3-hydroxynaphtho-β-naphthalide) compared with, say, Naphtol AS as due to the further extended conjugation. Additional peptide linkages also lead to increased substantivity, again possibly owing to the formation of a further bridge. This is shown by Bhat, Forster, and Venkataraman[13] and is also evidenced by the dianisidide of 2:3-hydroxynaphthoic acid (Brenthol DA) and the *p*-benzoylamino derivatives described by I.C.I. Ltd.[14].



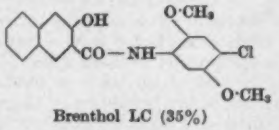
Brenthol DA



Increase in molecular weight, as by the introduction of chloro, methyl, methoxy, etc. substituents into the arylide ring, has some effect on substantivity, but the position of the groups may also be important; there is quite a difference, for example, in the substantivities of Brenthols LTR and LC—



Brenthol LTR (23%)

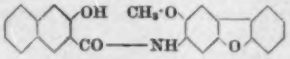


Brenthol LC (35%)

RED-PRODUCING COMPONENTS

By 1932 some eleven or twelve red-producing components had been put on the market by the German firms, and these gave a wide range of hues with reasonable fastness properties. For certain purposes, however, still higher fastness was desirable, and higher substantivity was particularly aimed at.

One of the most important hues was the Turkey Red originally obtained from alizarin. For many years the two standard combinations for this colour were Brenthol CT–Red TR (light fastness 5, soda boil fastness 5) and, where higher substantivity was required, Brenthol BN–Red KB (light 5–6, soda boil 5). In attempts to obtain better light fastness, the I.G. introduced Naphtol AS–ITR (Brenthol LTR). With most Bases this gives dull hues, and to get the bright Turkey Red hue they had to introduce also a new Base, namely Fast Red ITR Base, *o*-anisidine-4-sulphondiethylamide. This combination is a little bluer than Brenthol CT–Red TR, but the light fastness is considerably higher at 7. In more recent years two further Naphtols were introduced by the I.G., both mainly because of the fast Turkey Red hues which could be obtained, again with a new base, Red FR Base (originally Ciba Red Base V), 4:4′-dichloro-2-aminodiphenyl ether. The first of these, Naphtol AS–LC (Brenthol LC) was an isomer of AS–ITR. It has improved substantivity compared with AS–ITR, and gives, with Red FR Base, a yellower Turkey Red of light fastness 6–7. The second, Naphtol AS–S, has a substantivity of about 75%[15]. The light fastness is lower, however, at 5–6.

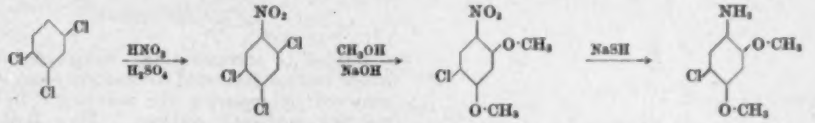


Naphtol AS–S (75%)

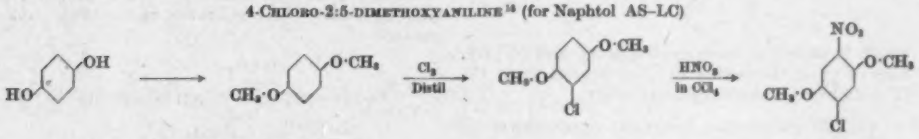
The improved properties of these three Naphtols over the earlier types have been obtained only by

a greater molecular complexity and therefore by a higher cost of manufacture. The complexity is shown by the following schemes outlining the steps involved in the synthesis of the amines required—

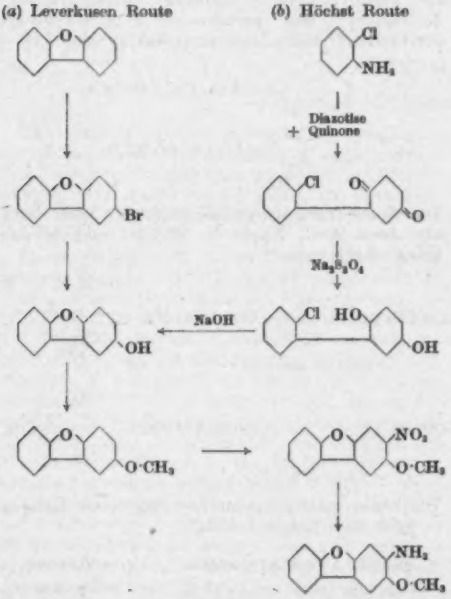
5-Chloro-2:4-dimethoxyaniline [16] (for Naphtol AS–ITR)



4-Chloro-2:5-dimethoxyaniline [16] (for Naphtol AS–LC)



2-Amino-3-methoxydibenzofuran [17] (for Naphtol AS–S)

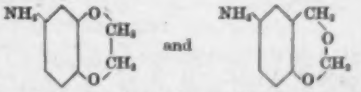


Apart from the Turkey Red hues, these three Naphtols are mainly of interest for the yellowish browns obtained with Scarlet 2G. The combinations, unlike those from Brenthol CT and Brenthol BN, however, are deficient in bright scarlets, etc.

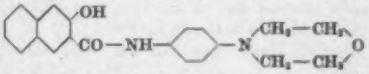
Another new component, which according to I.G. research information was considered for release after the War, was the *o*-toluidide of 6-bromo-2:3-hydroxynaphthoic acid [18]. This was claimed to give, with a new Base, a bordeaux fast to peroxide bleaching, a property not realised by existing bordeaux combinations.

A recent Ciba patent [19] covers arylides of 2:3-hydroxynaphthoic acid derived from 2:5-dialkoxyanilines in which the two alkoxy groups are different. They are thus related to the 2:5-dimethoxyanilide (Brenthol FO) and, judging from examples quoted in the patent, give similar hues. Thus the 5-methoxy-2-ethoxyanilide is described as giving, with Scarlet 2G, a bright orange–brown of outstanding fastness. The same firm claims [20], as highly substantive coupling components, the arylides derived from 2-aminobenzthiazoles, e.g. 2-amino-6-ethoxybenzthiazole.

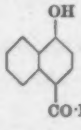
The American Cyanamid Co. claim [21] that the 2:3-hydroxynaphthoic derivative of 4-chloro-2-ethylaniline has superior properties to the corresponding toluidide. The same firm also cover 2:3-hydroxynaphthoic arylides from aminobenzodioxan [22], e.g.—



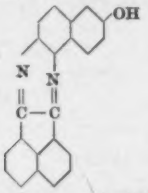
For use in printing compositions, where good solubility is required, both I.C.I.[23] and I.G.[24] have proposed the use of anilides containing $-O\cdot C_2H_4\cdot OH$ groups, e.g. 2-hydroxy-3-naphthoyl-2′:5′-bis-β-hydroxyethoxyanilide. Also for printing purposes, where low substantivity is advantageous, the General Aniline Co.[25] claim the use of arylides derived from 4-aminophenylmorpholines, e.g.—



Coupling components, other than 2:3-hydroxynaphthoic arylides, for the production of reds figure only to a limited extent. S.C.I. have used derivatives of α-naphthol containing an acyl group in the 4-position—



According to Disérens [26], Ciba Naphtol RP is of this type, being 4-benzoyl-1-naphthol. The same firm have also described the use of 5:8-dichloro-2-naphthol [27], 5-hydroxy-1-*p*-tolylbenztriazole [28], and the compound [29]—

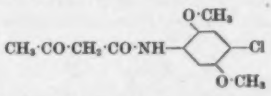


which is stated to have good affinity and to give reds of good fastness with Ciba Scarlet Base IV (2':4-dichloro-2-aminodiphenyl ether).

YELLOW-PRODUCING COUPLING COMPONENTS

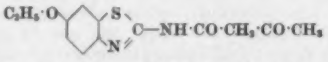
For many years the only yellow-producing coupling component was Naphtol AS–G (Brenthol AT), bisacetoaceto-*o*-toluidide. This gives a good range of greenish yellows to oranges, but the substantivity is not very high and the light-fastness in general is only moderate. Work in this field has therefore been devoted to getting products of higher substantivity for machine dyeing and products giving combinations of improved light-fastness.

In general, simple acetoacetarylides derived from substituted anilines have too low substantivity and too low colour value to be of use, although one such component is marketed by the I.G. for use in Rapidogens, where substantivity is not important. This is 4-chloro-2:5-dimethoxy-acetoacetanilide [30]—



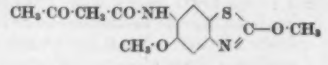
derived from the same amine as is Naphtol AS–LC. It is a component of Rapidogen Yellow I4G.

Another Naphtol used for a yellow Rapidogen (Rapidogen Yellow I3G) is Naphtol AS–L4G [31] of the I.G., which is—

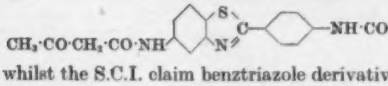


Its main interest lies in the fact that the yellows obtained with it are dischargeable.

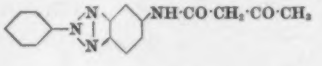
Francolor claim benzthiazole derivatives [32,33] such as—



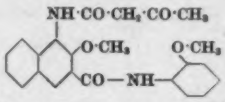
and



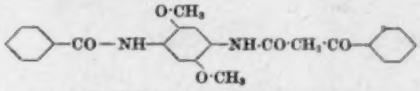
whilst the S.C.I. claim benztriazole derivatives [34]—



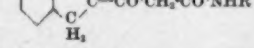
and also cover acetoacetamido derivatives of methoxynaphthoic arylides [35] such as—

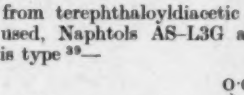


Instead of increasing the complexity of the amide residue, increased substantivity can also be achieved by replacing the acetoacetic by more complex acylacetic residues. Thus Rapidogen Golden Yellow IFG contains as coupling component—

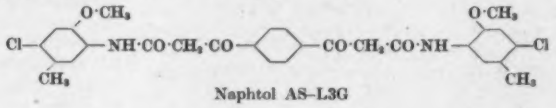


i.e. the acetoacetyl grouping has been replaced by benzoylacetyl [36]. Similar cinnamoylacetyl derivatives [37] and *pseudo*indole-2-carboxyacetyl derivatives [38] have been proposed by the I.G.—

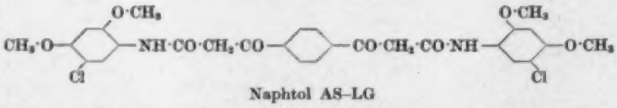




Diarylides from terephthaloyldiacetic ester have also been used, Naphtols AS–L3G and AS–LG being of this type [39]—



Naphtol AS–L3G



Naphtol AS–LG

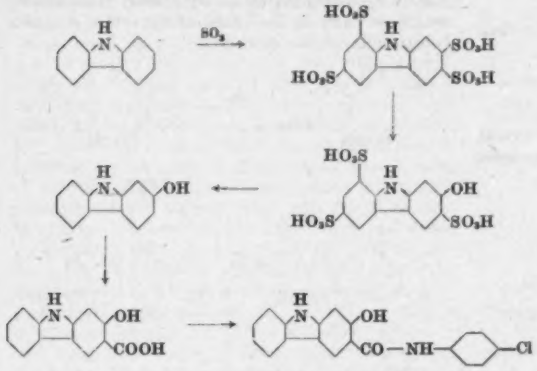
They have good substantivity and better fastness to light than Naphtol AS–G.

BROWN- AND BLACK-PRODUCING COMPONENTS

Although one or two of the red-producing coupling components give yellowish browns or orange–browns with certain of the standard Bases, in general, true browns are obtained only from derivatives of other hydroxycarboxylic acids than 2-hydroxy-3-naphthoic acid. The first brown-producing Naphtol, however, was a 2-hydroxy-3-naphthoic acid derivative, namely the dianisidide (Naphtol AS–BR, Brenthol DA). This gives reddish to purple browns of average light-fastness but of poor fastness to bleaching. As expected from its structure, it has high substantivity (p. 224).

A much superior component was introduced by the I.G. in 1933 under the name of Naphtol AS–LB (Brenthol BT). It has high substantivity, and gives khakis, olive–browns, and red–browns of very good

light fastness and reasonable wet fastness. It is 2-hydroxycarbazole-3-carboxy-*p*-chloroanilide [40]. In addition to its use in dyeing, it serves as the basis for a number of printing mixtures (Rapidogens, etc.). Its manufacture, however, is complicated, as shown by the following outline of the I.G. manufacturing process [41]—

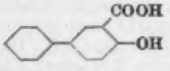


Naphtol AS–LB (Brenthol BT)

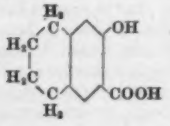
The amount of work involved in bringing a complicated product of this kind on to the market is indicated by the fact that the patent application relating to Naphtol AS–LB bears the date 17th November 1928, whereas the product was not marketed until 1933.

In order to obtain more neutral and deeper browns, Naphtol AS–BT (known as AS–DB in Great Britain) (Brenthol DB) was introduced in 1939. This is 3-hydroxydibenzofuran-2-carboxy-2′:5′-dimethoxyanilide. Fastness properties are good, but it has the disadvantage of being very sensitive to pH conditions during coupling, full development of colour being obtained only under carefully controlled conditions. The necessary carboxylic acid is made by carboxylation of 3-hydroxydibenzofuran [17], the synthesis of which has already been outlined under Naphtol AS–S (p. 225). The patent covering Naphtol AS–BT [42] also covers similar arylides of 3-hydroxydibenzthiophen-2-carboxylic acid; these give purplish browns and, with some Bases, blacks. Although no product of this type has yet appeared on the market, the *o*-ethylanilide was proposed by the I.G. as a Naphtol for use in a Rapidogen Black [43].

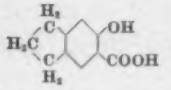
Many other polycyclic and heterocyclic hydroxycarboxylic acid arylides are described in the patent literature as giving valuable khakis and browns. The following may be cited—



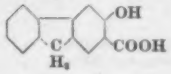
for browns and olive greens [44]



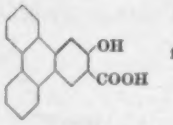
for browns and blacks [45]



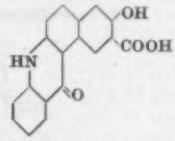
for olives and browns [46]



for olives [47]

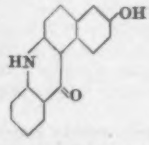


for browns, purples, and blacks [48]



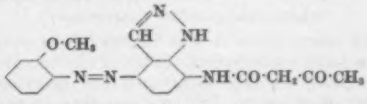
for browns [49]

In addition, a few heterocyclic hydroxy compounds not containing arylide groups have been suggested as azoic coupling components. Thus S.C.I.[50] cover—

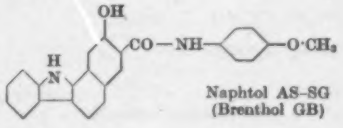


the parent of the carboxylic acid mentioned above.

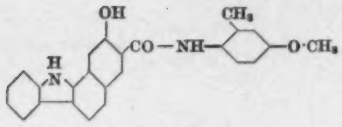
Of a rather different type are some derivatives with an indazole or benziminazole structure described by Francolor (see also under Bases, p. 232) [51,52]. They couple an aminoindazole or aminobenziminazole, e.g. 7-aminoindazole, with a diazo compound, convert the azo compound so obtained into an acetoacetyl derivative, and use this as a coupling component with known Bases. Olives and browns are obtained which become deeper and faster when aftercoppered on the fibre. A typical coupling component of this type is—



For the production of blacks, the I.G. introduced the two highly substantive Naphtols AS–SG (Brenthol GB) and Naphtol AS–SR (Brenthol RB) [53]. With Fast Red B Base the former gives a greenish black and the latter a reddish black, both of excellent fastness to light, soda boiling, etc. With other Bases, the hues are less important, being mainly purplish browns.

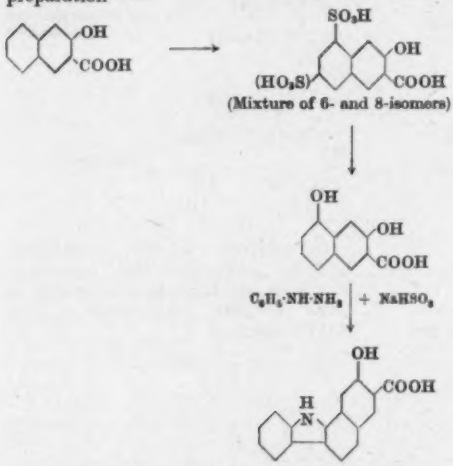


Naphtol AS–SG (Brenthol GB)

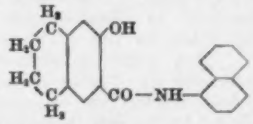


Naphtol AS–SR
(Brenthol RB)

Again a complicated synthesis is required for their preparation [17]—



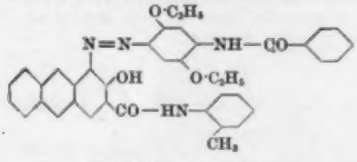
The AS–SR is also used in Rapidogen Black IT together with the *α*-naphthylamide of 2-hydroxy-5:6:7:8-tetrahydro-3-naphthoic acid [45,54]—



As mentioned above [43], the *o*-ethylanilide of 3-hydroxydibenzthiophen-2-carboxylic acid was also envisaged by the I.G. as a component for a black Rapidogen.

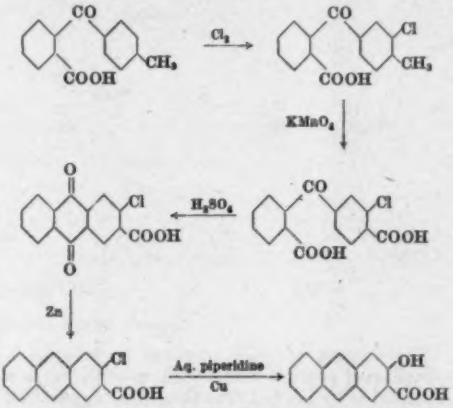
GREEN-PRODUCING COMPONENTS

For many years it was impossible to obtain a green azoic combination. Some of the heterocyclic derivatives already mentioned are described as giving olive greens, but only one type of product has been found so far which gives a reasonably bright green, and this is rather on the blue side. The combination concerned is 2-hydroxyanthracene-3-carboxy-*o*-toluidide (Naphtol AS–GR, Brenthol NG) with Fast Blue 2B Base—



(Rapidogen Green B)

A mixture of the stabilised diazo compound and the coupling component is sold as Rapidogen Green B. Unfortunately, the light fastness of this combination is not particularly good (4–5), and the problem of obtaining a really fast bright green azoic combination has still not been solved. The 2-hydroxyanthracene-3-carboxylic acid required for this Naphtol is obtained by an even more complicated synthesis than in the cases of the other complex compounds so far described [17]—



Azoic Diazo Components

GENERAL

The first compounds to be marketed were the Fast Bases (IG), comprising various amines in the form of either the free bases or their salts, such as hydrochlorides or sulphates. A big step forward, however, was the introduction shortly after 1922, by the German firms, of stabilised diazo compounds, known as *Fast Salts*, which merely required to be dissolved in water before use. The formation of stable complexes of diazonium compounds with e.g. zinc chloride or naphthalenesulphonic acids had been observed many years previously, and the Fast Salts made use of these long known principles.

Although many compounds are marketed now both as Bases and as Salts, some, because of technical difficulties in diazotising by the usual means at the dyer's disposal, appear only as Salts, and a few, because of the impossibility of obtaining complexes of sufficient stability, only as Bases. In considering the various hue ranges below, therefore, Bases and Salts will be considered together, without, in most cases, any distinction being made. Firstly, however, the various means employed in practice for obtaining stable diazo compounds will be briefly mentioned. By far the largest number of Fast Salts are stabilised as the zinc chloride double salts, examples being Orange GR, Red 3GL and RC, Scarlet 2G, Scarlet R, Corinth LB, Violet B, Blue 2B, Black K, etc. In the case of Red FR (4:4′-dichloro-2-aminodiphenyl ether), however, the cobalt chloride double salt is used [54]. The Variamine Blue Salts (aminodiphenylamines) are merely the diazonium chlorides, these being sufficiently stable in themselves, whilst Garnet

GBC Salt (aminoazo-*o*-toluene) is the corresponding diazonium sulphate. Sodium borofluoride is used as stabiliser for Orange GC (*m*-chloroaniline) and Red RL (5-nitro-*o*-toluidine). Benzene- and naphthalene-sulphonic acids are used in some cases, the most used being naphthalene-1:5-disulphonic acid (Orange R (*m*-nitroaniline), Red B (5-nitro-*o*-anisidine), Red GL (3-nitro-*p*-toluidine), Red TR (5-chloro-*o*-toluidine), etc.); but *p*-chlorobenzenesulphonic acid is used for *p*-nitroaniline (as Nitrazol CFK extra and Red 2G), acetylsulphanilic acid is used for Red KB (4-chloro-*o*-toluidine), and both *m*-nitrobenzenesulphonic acid and benzenesulphonic acid have been used by I.G. for Red F3G (4-chloro-6-cyano-*m*-toluidine)[54]. Diluents are also added, these being one or more of the following—aluminium sulphate (often used anhydrous for drying the mixture), sodium sulphate, magnesium sulphate, zinc sulphate, magnesium oxide, basic magnesium bicarbonate, disodium naphthalene-1:6-disulphonate, etc. In many cases much work has been necessary in order to find the best stabiliser and diluents to give a product of suitable solubility, stability, etc.

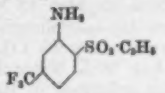
A very wide range of Bases and Salts is now available. They were originally of a fairly simple character, and were chosen to give as wide a range of hues as possible with the most widely used coupling components. Thus, in general, their names give an indication of the colours they give with these standard components. The original red-producing diazo components were generally derivatives of aniline, the toluidines, and the alkoxyanilines, substituted by an electronegative group such as chlorine or nitro. The general demand for greater fastness, however, and the necessity of finding components giving a particular hue with new coupling components have led to the introduction of a number of more complicated compounds. In addition, more complicated compounds are also required to extend the hue range from bordeaux to garnet, violet, blue, brown, and black.

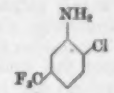
The provision of diazo components giving these hues with normal red-producing coupling components, as distinct from the use of special coupling components, is particularly necessary for the printing trade. Often the cheapest method of obtaining azoic prints is to pad in a solution of a suitable general-utility coupling component, particularly Naphtol AS, and print diazo components to give the desired hues. Only recently has it been possible to obtain a good brown in this way, and yellows and greens are still unobtainable.

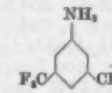
YELLOW- AND ORANGE-PRODUCING DIAZO COMPONENTS

There is no Base at present on the market which will give a yellow with the usual red-producing coupling components. In this connection it should be pointed out that "Yellow GC" is really a misnomer; this name is derived from its use with the yellow-producing Naphtol AS-G, the hues with red-producing components being actually redder than those from Orange GC Base.

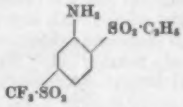
One of the most important orange Bases is Orange GC Base, *m*-chloroaniline, which gives a particularly bright yellowish orange with Brenthol OT; the light fastness of this combination, however, is only 4–5. A great improvement in this hue range, particularly as regards light fastness, was brought about by the introduction by the I.G. of three compounds containing trifluoromethyl groups[16,17,55]—


Golden Orange GR


Orange RD


Orange GGD

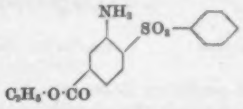
According to their research reports[43], yellower hues were obtained by the use of $SO_2{\cdot}CF_3$ groups, the compound—



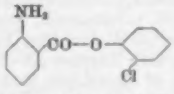
analogous to Golden Orange GR, being specifically mentioned. Bases of this type have not appeared on the market, possibly owing to difficulties of manufacture and high cost.

In all these Bases, it will be noted that the trifluoromethyl group is *meta* to the amino group. When it is in the *ortho* position, the hue becomes scarlet (see Scarlet VD, p. 230).

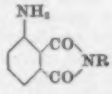
Another light-fast orange base put on the market by the I.G. was Orange LG, *o*-aminodiphenyl sulphone[17]. The S.C.I. claim a similar compound[56]—



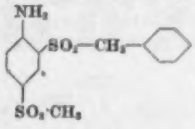
and have marketed an anthranilic acid derivative[7]—

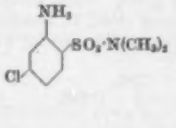

Orange Base Ciba V

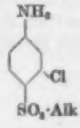
A rather similar type is[57]—



(R = alkyl, *cyclo*alkyl, aralkyl, etc.). The I.G. cover other sulphonyl-containing compounds in various patents, e.g.[58–60]—



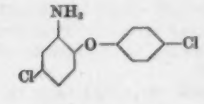




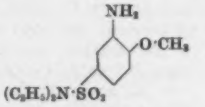
SCARLET- AND RED-PRODUCING DIAZO COMPONENTS

As already mentioned, a number of red-producing Bases have apparently been introduced to give a

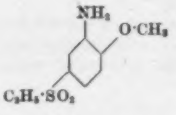
required hue with one or more of the newer, better coupling components. Thus, 4:4'-dichloro-2-aminodiphenyl ether, originally introduced as Ciba Red Base V, was also brought out by the I.G. as Red FR Base because it was the only Base to give Turkey Red hues with the fast-to-light Naphtol AS–LC and the highly substantive Naphtol AS–S (see p. 224). Similarly, *o*-anisidine-4-sulphondiethylamide had been earlier introduced by the I.G. to give essentially the same hue with Naphtol AS–ITR, this specific use being indicated in its name, Red ITR Base [61]. Subsequently, in order to get a rather yellower Turkey Red with the same Naphtol, Red GTR Base, 3-amino-4-methoxyphenyl ethyl sulphone, was introduced [17,61]. The fast-to-light Naphtol AS–LT (Brenthol MA) does not give a bright scarlet with any of the standard Bases, but this deficiency was overcome by the introduction of Scarlet LG Base, 3-amino-4-methoxyphenyl benzyl sulphone [17,62].



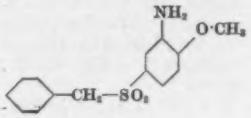
Fast Red FR Base



Red ITR Base



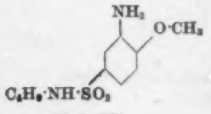
Red GTR Base



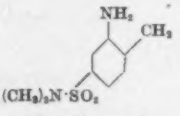
Scarlet LG Base

Other red-producing Bases of a similar type are *o*-anisidine-4-sulphonbutylamide, *o*-toluidine-4-sulphondimethylamide, and 3-amino-4-methoxyphenyl trifluoromethyl sulphone. The first of these, according to I.G. information, was to have been introduced after the War as Fast Red SW Base for use particularly with Naphtol AS–SW [63], the second is a constituent of Rapidogen Red I2G [54], and the third is stated to give excellent combinations with AS–ITR, AS–RL, and AS–D [63,64].

Six out of these seven Bases have the common feature of an ether grouping, either phenoxy or alkoxy, in the *ortho* position to the diazotisable amino group, and also have an electronegative group in the *meta* position. This configuration would appear to lead in general to combinations of high fastness to light and wet treatments. As the electronegative group, sulphonyl is preferred to a nitro group, which featured so prominently in earlier Bases (Red B, Scarlet R, etc.), because of its greater stability under kier-boiling conditions.

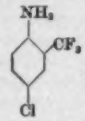


Red SW



Constituent of Rapidogen Red I2G

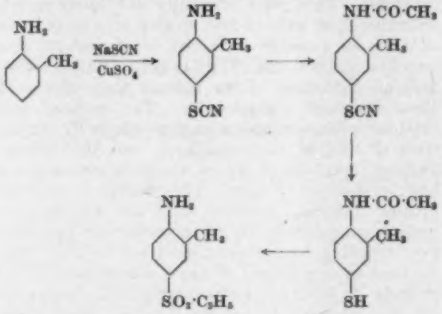
For printing purposes, the I.G. made use of a trifluoromethyl derivative—



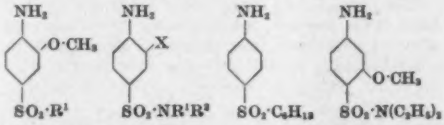
Fast Scarlet VD

This was not sold as the base, but was marketed as the stable diazo compound with naphthalene-1:5-disulphonic acid [54,65]. It gives a brilliant scarlet with Naphtol AS of outstanding fastness to light and weathering, this combination being actually used for the scarlet of the Nazi flag.

The Manchester Oxide Co. Ltd. have a series of patents covering various Bases which contain a sulphonyl group. These are isomers of the I.G. type, in which the $SO_2{\cdot}R$ group is *para* to the NH_2 instead of *meta*. The I.G. *meta* configuration is obtained by chlorosulphonation of acet-*o*-toluidide or acet-*o*-anisidide, whereas the *para* configuration is obtained by treatment of the amines with thiocyanate, a typical synthesis [66] being—



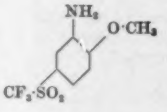
Other similar compounds [67–70] are—



(R^1 and R^2 = Alk or Ar; X = Alk, Ar, or Alk·O). The first two give reds, the third oranges, and the last maroons.

American Cyanamid Co.[71] have covered the use of bases containing SO_2F groups and claim, surprisingly, that they give combinations fast to wet treatments.

BORDEAUX- AND GARNET-PRODUCING DIAZO COMPONENTS



The well established bases in this hue range were Red B Base, Bordeaux GP Base, and Garnet GBC Base, all giving dyeings of good light-fastness but often of inferior wet-fastness, especially to kier-boiling—

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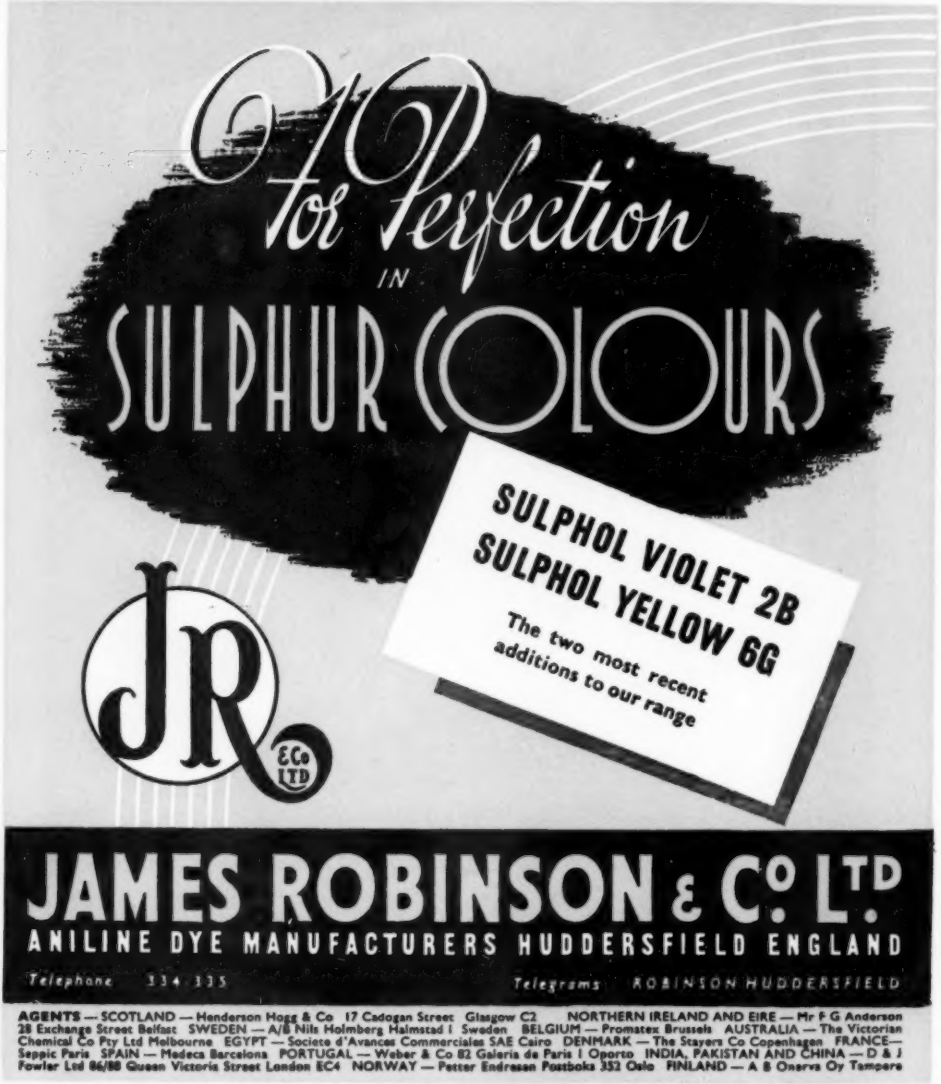

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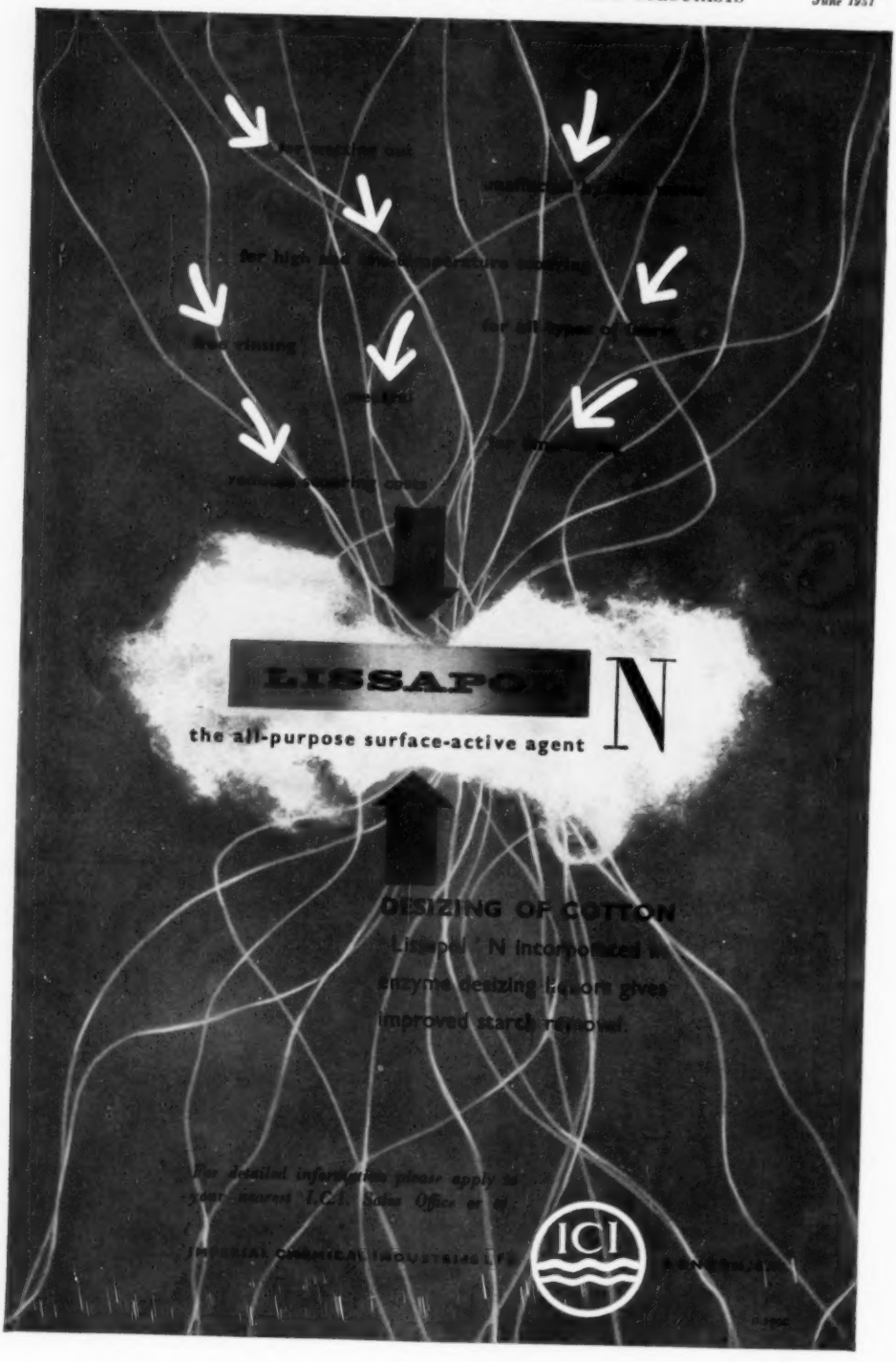
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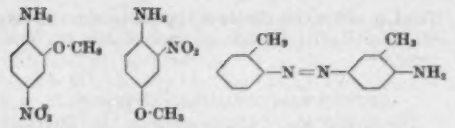
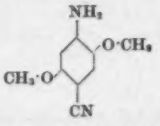


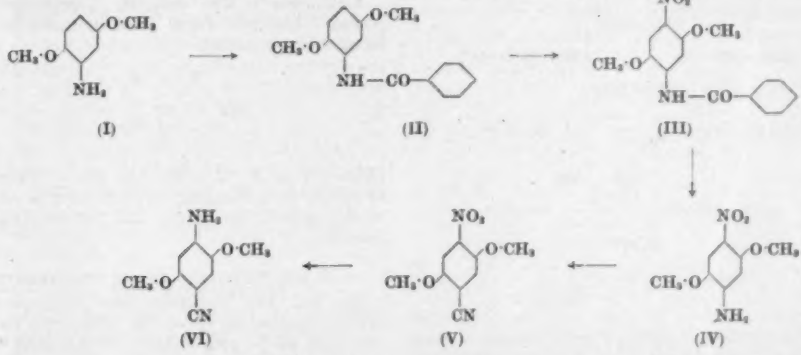
Red B Bordeaux GP Garnet GBC

Development has mainly been along the lines of improving fastness to kier-boiling, but other special properties have also come in for consideration. Thus in discharge printing, these nitro bases tend to give coloured haloes, due to back oxidation of the diamines formed on reduction. Further, the increased use in some countries of peroxide rather than hypochlorite for bleaching led the I.G. to look for Bases giving faster combinations to this treatment.

For printing purposes, I.G. added to their range, just before the war, Fast Bordeaux BD Salt, a stabilised zinc chloride salt of the diazo compound from 4-cyano-2:5-dimethoxyaniline [54]—



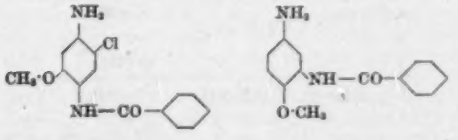
This gives beautiful hues of high light and wet fastness, and also gives clear discharges. Its drawback is its cost, due to its many-staged synthesis [17]—



(I) (II) (III) (IV) (V) (VI)

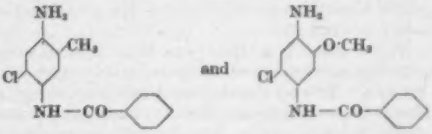
Stage III is actually a common intermediate for this Base and also for Fast Blue 2R Base (see p. 232).

For other purposes, including fastness to peroxide, the main lines of attack have been to replace the nitro group of the early Bases by a benzamido group. Thus Corinth LB Base (IG) [17,73] and Claret KB Base (ICI) [73] were of this type—



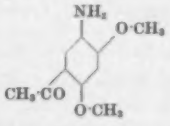
Corinth LB Claret KB

The I.G. were also interested in two other Bases of this class—

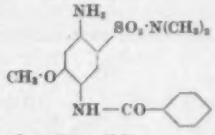


The first of these is stated to give a peroxide-fast bordeaux with 6-bromo-2:3-hydroxynaphtho-*o*-toluidide [16] whilst the second gives a valuable shade with Naphtol AS-TR [7].

Compounds having a *C*-acetyl group were also investigated [7], e.g.—



whilst Kuhlmann introduced —

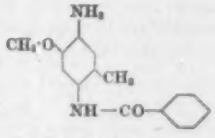


as a peroxide-fast Base [43,74].

A product claimed by Manchester Oxide Co. Ltd. to give maroons has already been mentioned (p. 230), whilst other types, described by the same firm and giving similar hues, are the diaminodiphenyl disulphides, e.g. 4:4′-diamino-2:2′:5:5′-tetramethyldiphenyl disulphide [75].

VIOLET- AND BLUE-PRODUCING DIAZO COMPONENTS

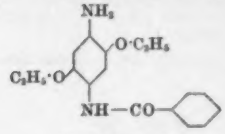
The only Base giving a bright violet of reasonably good fastness which has appeared on the market is 6-benzamido-4-methoxy-*m*-toluidine—



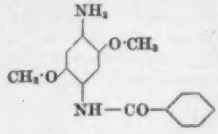
Fast Violet B

It gives combinations of good wet-fastness, but the light-fastness is only moderate, with the exception of the Naphtol AS–LT (Brenthol MA) combination, which is grade 6.

The original blue Base was Blue B, dianisidine, which gives combinations of relatively poor light-fastness. Further development has been along two lines, the *p*-aminobenzanilide type and the *p*-aminodiphenylamine type. The first is exemplified by Fast Blue 2B and Fast Blue 2R (IG)—

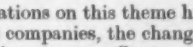


Fast Blue 2B

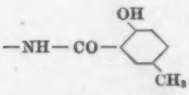


Fast Blue 2R

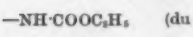
Many variations on this theme have been patented by various companies, the changes being mainly in the acylating group. Some examples are given below, the $-NH\cdot CO\cdot C_6H_5$ being replaced by the following—



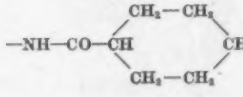
(I.G.)[76]



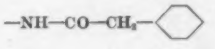
(I.G.)[77]



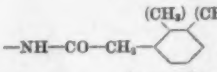
(du Pont)[78]



(du Pont)[79]

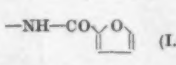


(S.C.I.)[80]



(S.C.I.)[81]

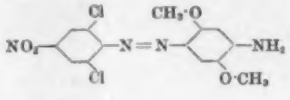
(*o*- or *m*-)



(I.C.I.)[82]

The aminodiphenylamine types, because of their difficulty of diazotisation, are marketed mainly as the stable diazo compounds; they are chiefly used for printing. The first Salt of this type was Variamine Blue B Salt, derived from 4-amino-4′-methoxydiphenylamine, and this was followed by two speciality products—Blue RT Salt and Blue FG Salt—derived, respectively, from 4-aminodiphenylamine itself and from 4-amino-3-methoxydiphenylamine.

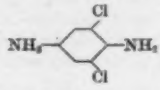
For deeper blues, an aminoazo compound was used; this, Dark Blue R Salt[54], is the zinc chloride double salt of diazotised 2:6-dichloro-4-nitroaniline →2:5-dimethoxyaniline—



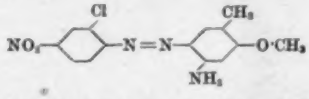
The I.G. claim also the same type of product having $-O\cdot CH_2\cdot CH_2\cdot OH$ groups instead of the methoxy groups[83].

BROWN-PRODUCING DIAZO COMPONENTS

The production of true browns on the usual red-producing coupling components used for printing is not easy, and only two components have appeared. Fast Brown 2R Salt (IG) is the zinc chloride double salt of diazotised 2:6-dichloro-*p*-phenylenediamine[54], only the amino in the *meta* position to the chlorine atoms undergoing diazotisation—

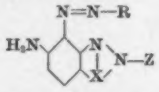


Fast Brown V Base, on the other hand, is an *o*-aminoazo compound obtained by coupling diazotised 2-chloro-4-nitroaniline to 2-methoxy-*p*-toluidine[17]—



Attempts by the I.G. to market this as a Fast Salt were unsuccessful, owing to the poor stability of the diazo compound when "stabilised" in all the usual ways.

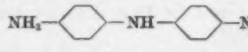
Kuhlmann[84] also describe *o*-aminoazo compounds derived from 6-aminoindazoles and 6-aminobenztriazoles—



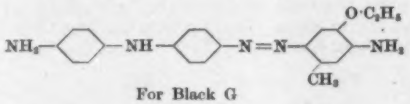
(X = CH or N; Z = H, Alk, etc.). These give brownish reds changing to dark browns on being aftercoppered (see also p. 227 for coupling components).

BLACK-PRODUCING DIAZO COMPONENTS

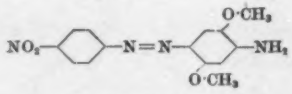
The I.G. had marketed three black-producing diazo components, all as the diazonium chlorides stabilised as the zinc chloride double salts[54]. The corresponding bases are—



For Black B (also marketed as such)



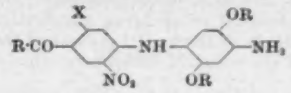
For Black G



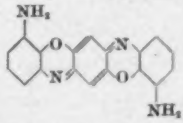
For Black K

The ethoxy group in Black G is stated to result in better stability than that shown by the corresponding methoxy compound.

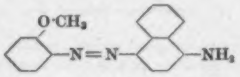
Other types have also been suggested: thus, the I.G. cover compounds of the type [85]—



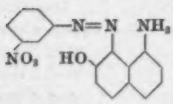
and also a diaminodiphendioxazine [86]—



The S.C.I.[87] and du Pont [88] describe aminoazo compounds, these being respectively—



and



GREEN-PRODUCING DIAZO COMPONENTS

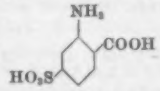
Diazo components which give greens with the normal yellow-producing coupling components are described by I.C.I.[89,90]. They are phthalocyanine derivatives, containing up to four groups of the type $-X\cdot Ar\cdot NH_2$ (Ar = arylene; X = O, S, CH_2, NH, $S\cdot CH_2$, $SO_2\cdot CH_2$, SO_2, NR, $NR\cdot CO$, $NR\cdot SO_2$, $SO_2\cdot O$, $CH_2\cdot S$, $CH_2\cdot O\cdot CO$, etc.; R = H or a hydrocarbon). Thus, phthalocyanine-tetra-(4-sulphonyl chloride) is condensed with four molecular proportions of *p*-nitroaniline, and the four nitro groups are then reduced.

Azoic Printing Mixtures

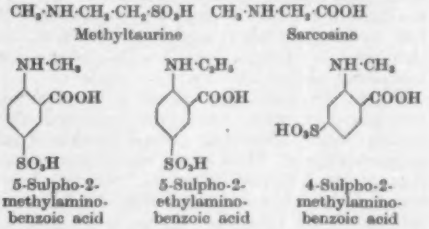
For textile printing, mixtures of stabilised diazo compounds and coupling components are available. These have the advantage over the padding process that a much wider range of hues on one fabric is possible. These mixtures are of three types—

The first is based on the *anti*-diazotates or nitrosoamines produced when diazonium compounds are treated with an excess of alkali. These nitrosoamines are stable, and incapable of coupling under alkaline conditions, but regenerate the active diazonium compounds on acidification; they can therefore be mixed with the alkali-metal salts of the coupling components and be printed in the form of thickened pastes. This process, applied to β-naphthol, was patented as far back as 1894 [91], but the first use of it with a Naphtol was made by Griesheim-Elektron (subsequently part of the I.G.), who introduced the mixture of the nitrosoamine of *m*-nitro-*p*-toluidine and Naphtol AS as Rapid Fast Red GL. A wide range of such products is now available, under the names *Rapid Fast* (IG) or *Brentamine Rapid* (ICI), covering yellows, oranges, scarlets, reds, bordeaux, blues, and browns. The components are chosen from the various coupling and diazo components already described, the choice being governed by stability of the nitrosoamine, solubility of the coupling component, rate of coupling, etc. The I.G. range makes use of fifteen different nitrosoamines and thirteen different Naphtols; a list is given by Saunders [92].

The second type is based on diazoamino or diazoimino compounds, i.e. triazenes; these are mixed with the sodium salts of coupling components, printed as thickened pastes, and developed by steaming in presence of an acid, such as acetic acid. Diazoamino compounds are of use in this process only when the stabiliser portion contains a negative group such as sulpho or carboxy; otherwise, on acidification, tautomerism occurs, and diazo compounds corresponding both to the original diazonium compound and to the amino compound used as stabiliser can result. In practice, the only stabiliser containing a primary amino group which is used is 4-sulphoanthranilic acid—



Stabilisers containing secondary amino groups are more usual, and five such compounds are used commercially by the I.G. in their Rapidogens—



Many others have appeared, however, in patent applications by various companies, e.g. pyrrole-2-carboxylic acid [93], secondary sugar amines [94], diguanides [95], guanylurea-*N*-sulphonic acids [96], etc. The choice of stabiliser for a particular diazo compound is governed by stability, speed of coupling, etc., whilst good solubility of their sodium salts is important for the coupling components. Within these limits, almost any diazo compound and any coupling component can be employed; it is also possible to use mixtures. The I.G. range (many examples of which have their counterparts in the Brentogen (ICI) range) comprises 38 mixtures, and uses 20 different triazenes and 18 Naphtols. In general, these have already been referred to in the two previous sections; a representative selection, again, is given by Saunders [92].

The need to use an acid developing agent is a serious drawback, since (i) it causes corrosion of the equipment, and (ii) it cannot be used for side-by-side printing of Rapidogens and vat dyes. Considerable effort has therefore been devoted to

attempts to develop so-called "neutral" developing methods[97]. One line of attack has been to incorporate in the printing mixture a substance which generates acid by dissociation or hydrolysis during ordinary steaming. Sodium chloroacetate has been suggested[98], as also has the use of salts of weak bases and strong acids. Some triazenes will split and couple under almost neutral conditions, and the use of these with a volatile base has been most successful; the best base is diethylaminoethanol, put on the market under the name Rapidogen Developer N (IG)[97]. The Rapidogens with which this can be used for neutral steaming are designated by the letter "N" after the name.

The third type of printing mixture is based on diazosulphonates (made by the action of neutral sodium sulphite on the diazo compounds), and the mixtures of these with Naphtols are marketed as Rapidazol Colours (IG). The majority of these are based on the Variamine Blue bases, the exception being Rapidazol Orange FB. For full development an oxidising agent is necessary, this being usually an alkali-metal chromate.

Miscellaneous

1. APPLICATION OF AZOIC COMPONENTS TO NON-CELLULOSIC FIBRES

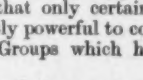
By reason of the high alkalinity of the dissolved sodium salts, the 2-hydroxy-3-naphthoic arylides are normally applied only to cellulosic, including regenerated cellulose, fibres. Special methods have been evolved, however, for their application to cellulose acetate and more recently to nylon. For the latter fibre, I.C.I.[99] employ a suspension of the free hydroxynaphthoic arylide at 60–65°c., and then treat the padded fibre in a bath of the diazo compound also at 60–65°c.

Where the high alkalinity is a disadvantage, coupling components have been suggested which contain other solubilising groups capable of subsequent removal. Thus, according to their research reports, the I.G. had investigated several derivatives of the 2-hydroxy-3-naphthoic arylides containing, in the 1-position, groups which conferred solubility in mild alkali or in acid, and which were split off during the coupling process. The drawback seems to be that only certain diazo components were sufficiently powerful to couple, and effect this elimination. Groups which have been examined are—

(i) SO_3H (soluble in carbonate)[7,100]

(ii) $CH_2{\cdot}N{\cdot}CH_3$ (soluble in acetic acid)[7,18]

(iii)

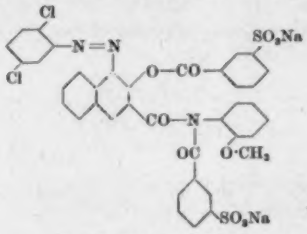


$CH_2{\cdot}NH{\cdot}C_2H_4{\cdot}OH$[7], $CH_2{\cdot}N(CH_3){\cdot}SO_3H$[7], etc. (soluble in carbonate)

(iv) $CH_2{\cdot}O{\cdot}CSSNa$ (soluble in water)[18].

2. TEMPORARILY SOLUBILISED AZOIC PIGMENTS

Several methods have been described for making temporarily solubilised forms of azoic pigments which can be applied by printing and then treated to split off the solubilising group. The best known, and the only commercial products of this type, are the Neocotones (Ciba). These are covered by a patent[101] and have also been described by Gränacher, Brüngger, and Ackermann[102] and in I.G. research reports[7,18]. The pigments are solubilised by means of *m*-sulphobenzoyl chloride, the *m*-sulphobenzoyl group being attached, according to the I.G., to both the OH group and the CO·NH group of the coupling component, thus—



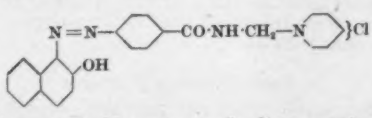
Neocotone Scarlet G

The printings have good stability, and after steaming are developed by passing for 5 min. through a bath containing barium chloride, caustic soda, and salt. Other members of the series are—

NEOCOTONE		DERIVED FROM
Orange GR	...	Fast Orange GC→Naphtol AS-OL
Scarlet 27	...	Red KB→Naphtol AS-PH
Red 2G	...	Red KB→Naphtol AS-D
Red R	...	Red TR→Naphtol AS-TR
Bordeaux R	...	Red RL→Naphtol AS-D
Bordeaux B	...	Bordeaux GP→Naphtol AS-OL
Blue B	...	Blue 2B→Naphtol AS

A yellow could not be obtained from the usual yellow azoic components, and Neocotone Yellow G was derived (according to I.G. research reports[18]) from an anthraquinone derivative.

S.C.I. have also covered compounds of the type[103]—



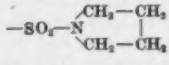
which are printed in presence of sodium acetate and then baked.

Sulphamic acid derivatives of Variamine Blue coupled compounds have also been proposed[104].

The I.G.[18] also investigated the use of azoic pigments containing the grouping—

$$-SO_2{\cdot}NNa{\cdot}CH_2{\cdot}CH_2{\cdot}CH_2{\cdot}CH_2{\cdot}O{\cdot}SO_3Na$$

which, by treatment on the fibre with alkali, undergoes ring-closure, giving—



Finally, Ufimtsev[105] describes the solubilisation of azo pigments with chloroacetyl chloride, followed by treatment with pyridine; the soluble derivatives are broken down by treatment with caustic alkali or ammonia.

The author wishes to thank Messrs. Imperial Chemical Industries Ltd. (Dyestuffs Division), Hexagon House, Manchester 9, for permission to publish this paper, and also members of the Dyehouse Department thereof for their helpful criticism and for providing the patterns displayed during the lecture.

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ERRATUM

Acceleration Vulcanising Agents suitable for use in presence of Furnace Blacks. Monsanto Chemicals Ltd. and W. M. Morgan. (*J.S.D.C.*, **67**, 121 (March 1951))— The number of the patent should be *B.P.* **647,572**, not "647,652".

Notes

Proceedings of the Council

At a meeting of the Council, held at the offices of the Society, 32–34 Piccadilly, Bradford, on 11th April 1951, the proceedings included the following items of interest—

ELECTION OF CHAIRMAN— Mr. Fred Scholefield (President of the Society) was re-elected Chairman of the Council for 1951–52.

ELECTION OF VICE-CHAIRMAN — Mr. F. L. Goodall was re-elected Vice-chairman of the Council for 1951–52.

NEW MEMBERS OF COUNCIL— The President welcomed new members on the Council (cf. p. 216), expressing the hope that they would enjoy a happy, congenial, and useful term of office. It was reported that the following had recently become *ex-officio* members of the Council—

Mr. C. O. Clark (*Chairman, West Riding Section*)
Mr. D. A. Derrett-Smith (*Chairman, Northern Ireland Section*)
Mr. G. E. Styan (*Honorary Secretary, West Riding Section*).

INTERNATIONAL STANDARDISATION OF MOTH-PROOFING TESTS— Mr. J. Barritt reported that he had represented the Society and the Textile Institute at a meeting held in Paris on 2nd April 1951 under the auspices of the International Wool Textile Organisation, and that he had been accompanied by Mr. P. T. Gale and Dr. E. A. Parkin, members of the Larval Test Subcommittee, as observers. The meeting had afforded a useful opportunity for exchange of ideas on methods of test, and some interlaboratory trials had been arranged.

MEMBERSHIP OF COMMITTEES— The membership of the non-technical committees of the Society was reviewed for the forthcoming session.

LEATHER DYES COMMITTEE— It was resolved that members be thanked for their services, and that the Committee be disbanded.

VAT DYES COMMITTEE— It was resolved that members be thanked for their services, and that the Committee be disbanded.

REPRESENTATION ON EXTERNAL BODIES— The representation of the Society on external bodies was reviewed for the forthcoming session.

PRESIDENTIAL BADGE— It was reported that the Presidential Badge had been presented to the Society by Dr. C. J. T. Cronshaw, Prime Warden of the Worshipful Company of Dyers, at the Annual Dinner (see p. 220). It was resolved that the profound gratitude of the Society be suitably conveyed to the Company.

FAIR COPYING DECLARATION— It was resolved that the Society should adhere to the Royal Society Fair Copying Declaration for an indefinite period.

HARROGATE CONFERENCE — The title *The Tinctorial Arts To-day* was approved for the Conference to be held at Harrogate on 20th–22nd September 1951.

MEMBERSHIP — Thirty-three applications for ordinary membership and eight for junior membership were approved.

Meetings of Council and Committees

May

Council— 9th
Finance— 9th
Publications— 10th
Colour Index Editorial Panel— 1st
Fastness Tests Co-ordinating— 4th
Terms and Definitions— 3rd
Presidential Badge— 9th

Percy Walmsley Cunliffe

Presentation of the Society's Gold Medal

The Gold Medal of the Society of Dyers and Colourists was presented to Dr. P. W. Cunliffe by Mr. F. Scholefield (*President of the Society*) at a meeting of the Manchester Section held at the Gas Department Showrooms on 13th April 1951, Mr. F. Farrington in the chair. Dr. Cunliffe was introduced by Mr. G. S. J. White, who mentioned his early work for the Society on fastness testing, and stressed the great value of the work of the Committees on the Dyeing Properties of the Direct Cotton, Vat, and Wool Dyes, Dr. Cunliffe having been chairman of all three committees.

In reply, Dr. Cunliffe said that he was very conscious of the honour which the Society had conferred upon him. He drew attention to the large amount of experimental work involved in the work of the Committees, and the generosity of the organisations which allowed this work to be undertaken in their own laboratories: His own firm had been most generous in granting him time to attend committee meetings and he had been greatly helped by his staff; he would like to think that all these shared the pleasure of receiving the award.

Harold Foster

Presentation of the Society's Gold Medal

The Gold Medal of the Society of Dyers and Colourists was presented to Mr. H. Foster by Mr. F. Scholefield (*President of the Society*) at a dinner of the West Riding Section held at the Great Northern Victoria Hotel, Bradford, on 6th April 1951, presided over by Mr. C. O. Clark. The medallist was introduced by Mr. H. H. Bowen (*President-elect*), who outlined Mr. Foster's long period of service as Honorary Secretary of the West Riding Section, which included the difficult war years, when Mr. Foster's ability and determination had enabled the Society, despite all difficulties, to hold its Annual Dinner in Bradford. Other outstanding events in this period, for the success of which Mr. Foster had been largely responsible, had been the Exhibition of Scientific Instruments in 1938 and the Fibrous Proteins Symposium in 1946. Mr. Foster had served as a Vice-president of the Society, and for a brief period had undertaken the duties of the Honorary Secretary.

In reply, Mr. Foster expressed his appreciation of the high honour the Society had conferred upon him and described the pleasure he had derived from working with past and present members of the Society.

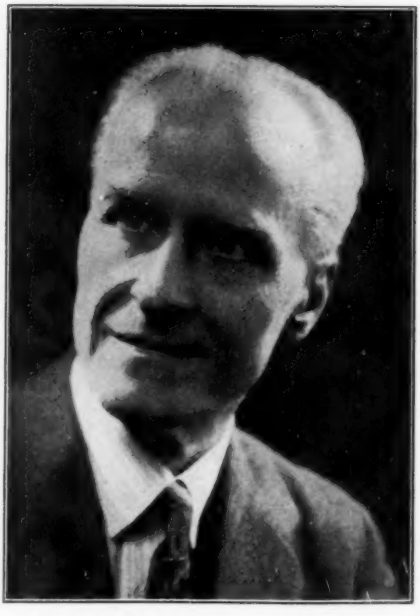
Professor JOHN BAMBER SPEAKMAN
D.Sc., F.R.I.C., F.T.I.

Perkin Medal in recognition of his Outstanding Contributions to the Science and Technology of Textiles

PERCY WALMSLEY CUNLIFFE
Ph.D., F.R.I.C., F.T.I.

Gold Medal for Outstanding Services to the Society and to the Tinctorial and Allied Industries

HAROLD FOSTER
Gold Medal for Outstanding Services to the Society



LOUIS AMÉDÉE LANTZ, Ing. Chim. E.C.M.
Bar to the Silver Medal for Exceptional Services to the Society and to the Tinctorial and Allied Industries in connection with Fastness Tests

The toast to Mr. and Mrs. Foster was proposed by Mr. J. M. Goodall, and a presentation made on behalf of the West Riding Section by Mr. E. A. Swift. Appreciations of Mr. Foster were given by Messrs. T. A. Forster, W. C. Holland, and Fred Smith.

Louis Amédée Lantz
Presentation of Bar to Society's Silver Medal

A Bar to the Silver Medal of the Society of Dyers and Colourists was presented to Mr. L. A. Lantz by Mr. F. Scholefield (*President of the Society*) at the meeting of the Manchester Section on 13th April 1951. Mr. Lantz was introduced by Dr. Cunliffe, who said that he had had an unbroken connection with the colour fastness work of the Society for twenty-three years, both acting as Chairman of the Fastness Tests Committee and carrying out much experimental work himself.

In reply, Mr. Lantz thanked the Society through the President for the distinction awarded to him. His interest in colour fastness dated back to his student days, and had been awakened by René Bohn, the inventor of the first anthraquinone dyes, when he had visited the École de Chimie in Mulhouse and demonstrated his new dyes, Indanthren and Flavanthren, describing their outstanding properties. A few years later, when a chemist at the Zundel Printworks in Moscow, which enjoyed a high reputation for the fastness of its products, Mr. Lantz had constant contact with fastness questions, especially as that was the time when new vat dyes were being invented in large numbers, and had to be examined and tested. World War I interfered, there was a great shortage of dyes, and for a time any dye, even the most fugitive, was good enough. But when he came to England in 1923, this had been overcome, and the Guaranteed Fast Colour campaign was in full swing. There was great discussion between those who held the view that high colour fastness was unnecessary and undesirable, because it would lead to a fall in turnover, and those who believed that the trend towards greater and greater colour fastness was a natural evolution, which could not and should not be stopped. He had very much enjoyed the work of the Fastness Tests Committee. If there had been any achievement on his part, it had been due to the constant and unselfish support of all the Committee members, and he wished to share with them in spirit the distinction he had received.

OBITUARY NOTICE

Leonard Thompson
1900–1950

The recent death of Leonard Thompson has robbed the Society of Dyers and Colourists of one of its hard working and conscientious members.

His efforts for the Society are appreciated and remembered more by the older members of the Manchester Section than by the post-war members. Following J. Campbell Gray in 1921 as Honorary Secretary of the Manchester Section, he served in that capacity until 1926, a deserving term of office. He never sought the limelight, but the record and high merit of the lectures and activities of the Section during that period bear witness to his painstaking devotion to duty.

Continuing to serve as a member of the Manchester Committee after relinquishing the Secretaryship, he became Chairman from 1940 to 1942, during the most difficult of the war years. He kept the Section together when bombing made meetings infrequent and difficult to arrange. Hidden beneath a rather shy exterior was an enthusiasm for the Society and a knowledge of its traditions which were invaluable to his colleagues.

Latterly his activities for the Society were greatly hampered by indifferent health; though only a few days before his death he confided to a member of the committee that he was anxious once again to take a more active interest in affairs. His sudden death was a great shock to those who knew him well, and a realisation that one who had done so much had ended a life of service.

G. M. Williams

Reports on German Industry

I.G. Farbenindustrie A.-G., Mainkur and Höchst
Khaki Camouflage Printing Ink
Airman's Emergency Sea Suit

FD 67/51* (PB 28,319).

Report by an Allied investigator. Search was made for a dye that could be printed on cotton to give the same effect from either visual or infra-red observation. Indanthren Printing Olive GW Suprafix gave promise, and from this was developed Hydron Olive GX-Anthracen.

A very successful garment for airmen immersed in the sea was made from a pile fabric whose pile was impregnated with a mixture of 24·4% Mersolat H 30 salt-free, 41·46% $NaHCO_3$, and 34·14% citric acid. This frothed on contact with sea-water and filled the pile with bubbles. Such a suit kept a man warm for 9 hr. when immersed in cold sea-water. C. O. C.

I.G. Farbenindustrie A.-G., Leverkusen
Optical Bleaching Agents

FD 101/51* (PB 716).

A paper of 4 pp. written in German in 1941. Diazo Fast Yellow GG (nitroaminostilbencsulphonic acid condensed with *p*-nitrobenzoyl chloride, reduced, and again condensed with *p*-nitrobenzoyl chloride and then reduced) had been found to possess a light bluish fluorescence, so giving it optical bleaching properties. 34 products of similar constitution were investigated. C. O. C.

* Material available for inspection at, and photocopies available from, T.I.D.U., Board of Trade, Lacon House, Theobalds Road, London W.C.1, or (under PB No.) from Office of Technical Services, Department of Commerce, Washington D.C., U.S.A.

Abstracts from British and Foreign Journals and Patents

(The Titles of Patents are abridged and modified)

I—PLANT; MACHINERY; BUILDINGS

PATENTS

Wool Scouring. W. H. Dean and W. H. Robinson. *B.P.* 650,419.

The settling and side tanks are equipped with high-pressure water and steam pipes, which can direct their jets to the parts of the tanks where the major deposits occur. This substantially reduces the time needed to clean out the tanks. C. O. C.

Thread-advancing Reels. British Celanese Ltd. *B.P.* 650,167, *B.P.* 650,191.

Uniformly Dyeing Rayon Cakes. E. A. Stienen. *B.P.* 650,269.

A basket having outer perforated cylindrical walls is coaxially supported by a perforated spindle. An adjuster in the basket has a core which surrounds the spindle and a perforated outer tapered wall which bears against the tapered face of the rayon cake placed in the basket. The adjuster has a disc-shaped wall at one end which bears against the rayon cake and a wall at its other end. The adjuster can be moved up and down the spindle to compress the rayon cake to the desired pressure and density. The apparatus gives uniform dyeing. C. O. C.

Controlling the Consistency of Size being delivered to Size Boxes. Dominion Textile Co. Ltd. *B.P.* 650,970.

Laundering Clothes. T. D. Reeve. *B.P.* 650,347.

Modification of *B.P.* 582,001 (cf. J.S.D.C., **63**, 120 (1947)). Possibility of slip and stretch is reduced by replacing the conveyor belt in each of the two baths by a compound conveyor made up of two or more endless travelling bands, the upper runs of which co-operate to form the upper run of the compound conveyor on which the garments travel through the bath. Gaps left between the upper runs of the individual bands allow freer access of the liquor to the garments passing through the bath and facilitate rotary brushes being brought to bear on the garments. C. O. C.

Drying by circulating Hot Air. J. K. Innes & Co. Ltd. and J. K. Innes. *B.P.* 649,989.

Small-diameter centrifugal fans mounted on a common shaft extending parallel to the drying chamber deliver a series of parallel air streams tangential to the impellers directly into the drying chamber. This gives the same intensity of air flow throughout the drier and renders unnecessary deflectors and baffles for guiding the air into the drying chamber, which would cause turbulence and eddies. C. O. C.

Resilient Padding for Laundry Machinery. D. & J. Tullis Ltd. and R. Wilson. *B.P.* 650,212.

A number of spring-carrying strips are each wound around the roller of an ironing machine with the ends of each strip attached to the roller. Cover strips are wound around each of the spring-carrying strips, and each has one end attached to the roller by the same screw that fastens the corresponding spring-carrying strip. A woven wire cloth is lapped upon the strip assembly. This is cheaper than textile clothing and renders unnecessary periodic renewal or "build-up" of the clothing to keep the diameter of the roller in line with the companion bed. C. O. C.

Feeding Fluid Material on to a Band or Belt Conveyor on which it is to be treated. Steel Band Conveyor & Engineering Co. Ltd. and J. Meredith. *B.P.* 650,898.

A feeding device which ensures uniform thickness of material being delivered on to the band and prevents air bubbles or solid matter from going forward is described. C. O. C.

II—WATER AND EFFLUENTS

Study of the Prevention of Scaling. M. Pourbaix. *Bull. Centre belge Étude et Document. Eaux* (Liége), 331–339 (1949): *Chem. Abs.*, **45**, 793 (25th Jan. 1951).

Small quantities of U and Th salts added to hard water act somewhat similarly to hexametaphosphates in that they reduce scaling by forming soluble carbonate complexes. A similar effect is obtained if U salts or other radioactive substances are enclosed in Zn containers and submerged in the water. The effect is probably due to the action of certain irradiated metals and has some relation to the Becquerel effect. Water which has been treated with weak A.C. behaves very differently from untreated water when heated in that (1) methyl orange alkalinity is more rapidly reduced, (2) a very fine crystalline ppt. of $CaCO_3$ is formed immediately, (3) spraying the water in air seems to destroy the effect of the treatment, and (4) on boiling, untreated Liége water forms a suspension of aragonite. A simple, portable apparatus for determining the efficiency of various treatments is described. Certain methods, e.g. addition of organic substances or sodium aluminate, are based on formation of vaporisation nuclei; this causes acceleration of the rate of vaporisation as well as separation of solids in a finely divided form rather than as scale. The mechanism of the interaction between metallic surfaces and liquids is explained by means of a diagram representing the Fe–H_2O system in which equilibrium potential is plotted against pH. Application of D.C. and A.C. to iron electrodes is discussed with reference to the same system. Control of electrical water treatment is possible by continuously determining the p.d. between the electrodes and a calomel reference electrode. This is based on gradual corrosion of the metal electrodes to form colloidal products which act as crystal nuclei for $CaCO_3$ and accelerate thermal decomposition of the $Ca(HCO_3)_2$ in solution. C. O. C.

PATENT

Cold-process Water Softening Plant. Worthington Pump & Machinery Corpn., R. H. Hoffman, and G. P. Clement. *U.S.P.* 2,526,478.

III—CHEMICALS; AUXILIARY PRODUCTS; FINISHING MATERIALS

Aluminium Oxychloride. H. Schäfer, C. Göser, and L. Bayer. *Z. anorg. Chem.*, **263**, 87–101 (1950): *Chem. Abs.*, **45**, 489 (25th Jan. 1951).

A review of the literature on basic aluminium chlorides. C. O. C.

Molecular Interaction and its Relation to the Formation of Sodium Dodecyl Sulphate–Cetyltrimethylammonium Bromide Complex. R. Matalon, M. R. J. Salton, and M. Cohen. *Nature*, **167**, 241 (10th Feb. 1951).

Estimation of cationic and anionic detergents by mutual titration is invalid when the reagents are not well purified, owing to the presence of polar compounds such as long-chain alcohols which form a molecular association with the detergent. Relatively high amounts of hexyl or heptyl alcohol are needed to prevent precipitation, but the presence of equimolecular proportions of octyl or nonyl alcohol inhibits the formation of sodium dodecyl sulphate–cetyltrimethylammonium bromide complex. A 0·003 M. solution of these substances with octyl alcohol is completely clear for the molecular ratio 1 : 1 : 1. That the anionic detergent loses some of its properties appears, therefore, to be due to the competing effect of the alcohol–sodium dodecyl sulphate complex. J. W. B.

Ethyleneimine—Application and Permanent Finishing of Cellulosic Materials. W. Wigman. *Mededeel. Vezelinst. T.N.O.*, No. 83, 40 pp. (1947): *Chem. Abs.*, **44**, 9679 (25th Oct. 1950).

Patents (mainly I.G.) relating to the preparation and use of ethyleneimine and its deriv. for modifying the dyeing and mechanical properties of cellulose fibres are reviewed. *NN'*-Ethyleneurea (1:3-diazolid-2-ones), obtained from ethyleneimine and mono- or di-isocyanates, aliphatic *N*-chloroamides, or cyanuric chloride, are the most promising compounds. Condensates of ethyleneimine with compounds containing active Hal or CO groups, with acids and esters, with S compounds, etc. are described. There are 91 references. C. O. C.

Natural Tannins. IV—Chebulagic Acid from Divi Divi. O. T. Schmidt and R. Lademann. *Annalen*, **569**, 149–153 (1950).

PATENTS

Water-soluble Derivatives of Bishydroxyalkylamides of Dimerised Polyunsaturated Fatty Acids—Non-ionic Surface-active Agents. American Cyanamid Co. *B.P.* 650,940.

Water-soluble derivatives of compounds of formula $HO{\cdot}C_nH_{2n}{\cdot}NR^2{\cdot}CO{\cdot}R^1{\cdot}CO{\cdot}NR^2{\cdot}C_nH_{2n}{\cdot}OH$ (R^1 = residue of a dimerised polyolefinic fatty acid whose monomer has 18–20 C; R^2 = H or $-C_nH_{2n}OH$; n = 2–4) are obtained by condensing one mol. of such a compound with at least 8 mol. of an alkylene oxide of 2–4 C. They have good dispersing and emulsifying properties and are particularly valuable as dyeing assistants for premetallised acid dyes. C. O. C.

Surface-active Compositions. Sun Chemical Corpn., H. B. Goldstein, and A. S. Waldman. *U.S.P.* 2,528,136.

The surface activities of the products obtained by the esterification of methoxypolyethylene glycols with saturated higher fatty acids are optimum when the products have an acid value of 26–43. C. O. C.

Detergent Compositions highly resistant to Hard Water. Procter & Gamble Co. and W. C. Preston. *U.S.P.* 2,527,075.

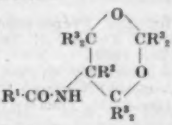
Primary or secondary sat. or unsat. aliphatic alcohols of 10–20 C have no power to inhibit precipitation of lime soap when used with soap alone, but when used with a mixture of soap and a synthetic detergent they possess such power to a marked degree. *U.S.P.* 2,527,076.

Carboxyamides of 10–26 C and formula $R^1{\cdot}CO{\cdot}NR^2R^3$ (R^1 = H, Alk, or hydroxyalkyl; R^2 and R^3 = H, Alk, hydroxyalkyl, or alkylenes joined by an O atom) have the same properties. *U.S.P.* 2,527,077.

Polyhydric alcohols partly esterified with aliphatic carboxylic acids of 8–25 C have the same properties.

Procter & Gamble Co. and N. B. Tucker. *U.S.P.* 2,527,078.

Compounds of formula—



(R^1-CO = acyl radical of a sat. or unsat. aliphatic carboxylic acid of 10–25 C; R^2 = H, CH_3, CH_2OH, C_2H_5, $CH(OH)$-CH_3, or C_2H_5; R^3 = H, CH_3, C_2H_5, or C_2H_5; the sum of the C atoms in R^2 and all the R^3s is < 6), e.g. the lauramide of 5-amino-1:3-dioxan, have the same properties. C. O. C.

Lubrication of Textile Fibres. Textile Oils Ltd., C. W. A. Mundy, and R. H. H. Morley. *B.P.* 650,759.

Textile fibres are oiled with an easily emulsifiable and scourable composition made by adding to a mineral oil, or a blend of triglyceride fatty oil with not $< 20\%$ of mineral oil, 5–10% of a blend of esters prepared by reaction of a non-drying triglyceride, e.g. olive or arachis oil, with a polyhydric aliphatic alcohol, e.g. ethylene glycol, glycerol, or sorbitol, in such proportions that the product is wholly or substantially a blend of partial fatty esters containing 1–3 unesterified OH groups derived from the alcoholic component. J. W. B.

Coating and Sizing Composition. Union Carbide & Carbon Corpn. and C. R. W. Morison. *U.S.P.* 2,527,643.

Compositions especially suitable for sizing warps of glass fibre, nylon, acetate or viscose rayon, etc. consist of a soya-bean glue and a water-soluble cellulose ether, if desired with a compatible plasticiser for the ether. C. O. C.

Hydroxyalkyl-substituted Alkylguanidines. American Cyanamid Co. *B.P.* 650,820.

Water-soluble or water-dispersible hydroxyalkyl-substituted alkylguanidines are prepared by treating an alkylguanidine or a salt thereof with enough of an alkylene oxide to give a product soluble or dispersible in water. In one example propylene oxide (47·5 g., 0·82 mol.) is added to octadecylguanidine acetate (50 g., 0·134 mol.) in a mixture of *iso*propanol (80 g.) and water (50 g.). After 15 hr. at 65°c. the product forms a clear solution in dil. acetic acid, an acidified aq. solution being a good cationic softener for cotton and rayon. J. W. B.

Rendering Fibrous Materials immune to Attack, and free from Infestation, by Insects. Geigy Co. Ltd., H. T. Fergusson, and R. Williamson. *B.P.* 650,403.

Insecticides of formula $CHR_2{\cdot}CX_3$ (X = Cl or Br; R = a benzene ring *para*-substituted by Hal, Alk, or alkoxy) can be applied effectively as a cool aqueous dispersion if the disperse phase contains the insecticide and is positively charged by means of casein or blood albumen associated with enough of an organic acid to bring the pH of the dispersion below the isoelectric point of the casein or blood albumen. C. O. C.

Agent for Producing a Durable Finish on Textiles. United Merchants & Manufacturers Inc., W. R. Tornquist, and L. H. Vandermark. *U.S.P.* 2,526,301.

A durable finish is obtained by applying a composition made up of 7·4% purified cellulose dispersed in 5% aqueous sodium hydroxide containing 3·6% of a cellulose ether. The composition may be fixed in the fibre by any suitable treatment, e.g. coagulation with acid, which may be applied either before or after bleaching, dyeing, printing, or finishing. C. O. C.

Amine–Aldehyde Resins for Coating or Impregnating Textiles, Paper, Leather, etc. du Pont and M. E. Cupery. *U.S.P.* 2,526,639.

The products obtained by condensing formaldehyde with polymeric primary amines produced by hydrogenating copolymers of 67–84% 1:3-butadiene and 33–16% acrylonitrile or methacrylonitrile vary from viscous liquids to resinous solids. They are soluble in dilute aqueous acids and can be used for reducing the felting power of wool, waterproofing textiles, sizing paper, in water-base paints, etc. C. O. C.

Resinous Coating Composition for Jute. Montclair Research Corpn., Ellis-Foster Co., and W. B. Canfield. *U.S.P.* 2,527,057.

Jute is sized while retaining its flexibility by using an emulsion of the product obtained by heating 1 mol. of pentaerythritol, 2 mol. of a mixture of tall oil and rosin (30–40% fatty acid, 70–60% rosin acids), and 1 mol. of a mixture of maleic (80–95%) and phthalic (20–5%) anhydrides at 250–300°c. until the product has acid number 10–20 and softening point 80–90°c. The sized yarn has a high degree of resistance to alkali and water. The size on the yarn is non-heat-hardenable after drying. C. O. C.

Conversion of Bhilawan Shell Liquid to a Non-vesicating Drying Product for the Manufacture of Lacquer Varnish, Stoving Enamels, Waterproofing or like Materials. S. Siddiqui and D. C. Dhar. *B.P.* 650,342.

The product obtained by copolymerising vegetable oils with Bhilawan shell liquid and turpentine or rosin or an oleorosin by treatment with nitric acid is used for producing varnishes, stoving enamels, etc. for waterproofing textiles or imparting artificial leather finishes to cloth or paper. A tack-free film is obtained in 3–4 hr. by air drying. C. O. C.

Polyvinyl Acetal Hot-melt Coating Compositions. Monsanto Chemical Co., C. K. Bump, and G. H. Bischoff. *U.S.P.* 2,527,793.

Incorporation of a liquid silicone into hot-melt coating compositions based on polyvinyl acetal resin imparts high adhesive properties with a minimum of tackiness when cold. C. O. C.

Stable Dry Preparations of Hardenable Binding Agents. Ciba Ltd. *B.P.* 650,977.

B.P. 645,023 (cf. J.S.D.C., **67**, 84 (Feb. 1951)) describes the preparation of aqueous emulsions of artificial resins. Emulsions of that type can by careful drying be converted into stable dry preparations without any loss of hardening capacity. C. O. C.

Cyclic Organoaminosilanes useful as Water-repellent Agents. British Thomson-Houston Co. Ltd. *B.P.* 650,822.

Compounds of formula $[Si(CH_3)_2{\cdot}NH]_n$ (n = 3 or 4) are particularly useful for imparting a water-repellent finish. They are prepared by treating a dimethyldihalogenosilane dissolved in benzene with ammonia in absence of water. C. O. C.

Organosilicon Compounds—Hydrophobing and Antifoaming Agents. Dow Corning Corpn. and J. T. Goodwin, Jr. *U.S.P.* 2,527,807.

Compounds of formula $R{\cdot}SiY_2{\cdot}CH_2{\cdot}SiR_2{\cdot}CH_2{\cdot}SiY_2{\cdot}R$ (R = Alk or monocyclic Ar; Y = O·Alk or Hal) are prepared by treating a compound of formula $Hal{\cdot}CH_2{\cdot}SiY_2{\cdot}R$ with one of formula R_2SiY_2 in presence of an alkali metal. *U.S.P.* 2,527,808.

Hydrolysis and condensation of compounds of formula $R{\cdot}[SiR_2{\cdot}CH_2]_n{\cdot}SiY_2{\cdot}R$ (n = 1 or 2) yield cyclic or linear polymers. They are liquids useful *inter alia* as hydrophobing agents. *U.S.P.* 2,527,809.

Addition of a composition containing $Si(CH_3)_2{\cdot}O$ units to the cyclic dimer of the $-Si(CH_3)_2{\cdot}CH_2{\cdot}Si(CH_3)_2{\cdot}O-$ unit (obtained by hydrolysis of a compound of formula $Y{\cdot}Si(CH_3)_2{\cdot}CH_2{\cdot}Si(CH_3)_2{\cdot}Y$ followed by copolymerisation) yields high-mol.wt. copolymers containing

$$-Si(CH_3)_2{\cdot}CH_2{\cdot}Si(CH_3)_2{\cdot}O-$$

units. They are liquids useful as antifoaming agents. C. O. C.

Siliceous Products useful as Waterproofing Agents. Société des Usines Chimiques Rhône-Poulenc. *B.P.* 650,830.

A hydrocarbon-substituted halogenosilane is hydrolysed to the siloxane in presence of a silica aerosol obtained by burning a silicon compound. The consistency of the products varies with their SiO_2 content, some of them being suitable for incorporation in plastics. C. O. C.

Increasing the Adhesiveness and Resistance to Ageing of Polyvinyl Acetal Hot-melt Compositions. Monsanto Chemical Co., G. R. Sido, and J. F. Murphy. *U.S.P.* 2,527,856.

Ethers of aldehyde–arylsulphonamide condensates, e.g. the compound prepared by treating *p*-toluenesulphonamide with formaldehyde in presence of alkali and then treating the product with propanol in presence of acid, are added to the composition to improve its adhesiveness and resistance to ageing. C. O. C.

Stabilised Solutions of Driers. Ferro Chemical Corpn., S. B. Elliott, and R. J. O'Hara. (V, p. 245.)

IV—RAW MATERIALS; INTERMEDIATES; COLOURING MATTERS

Mesomerism and Colour. I—General. A. Bruylants. *Ind. Chim. belge*, **15**, 114–122 (1950). **II—Conditions.** J. Nys. *Ibid.*, 123–137. **III—Mesomerism and Coplanarity.** A. van Dormael. *Ibid.*, 138–147. **IV—Definition of Dyes according to their Structure.** P. Bruylants. *Ibid.*, 148–154: *Chem. Abs.*, **45**, 1493 (25th Feb. 1951).

Reviews. C. O. C.

Researches on Dichroism of Planar Complexes—I. S. Yamada. *J. Amer. Chem. Soc.*, **73**, 1182–1184 (March 1951).

Measurement of the dichroism of microscopic crystals in the visible to near ultra-violet region shows that dichroism of planar complexes falls into the tetrahalogeno and the tetracyano types. These two types of dichroism are discussed from the standpoints of the theory of absorption spectra for metallic compounds and the Tsuchida co-ordination theory of valency. C. O. C.

Intermediates for Azo Dyes—Arylamino Derivatives of Urea. Z. Blazek. *Chem. Listy*, **42**, 121–124, 155–161 (1948): *Chem. Abs.*, **45**, 569 (25th Jan. 1951).

By condensing the acid chloride $(C_6H_5)_2N{\cdot}CO{\cdot}Cl$ with aromatic diamines or acyl derivatives thereof, compounds of formula $(C_6H_5)_2N{\cdot}CO{\cdot}NH{\cdot}R{\cdot}NH_2$ (R = simple or substituted phenylene) are produced. Thus, with *p*-aminoacetanilide in presence of pyridine 1:1-diphenyl-3-*p*-acetamidophenylurea is formed, which on hydrolysis with HCl in methanol, followed by basifying, gives 1:1-diphenyl-3-*p*-aminophenylurea. Many derivatives of this substance, made from appropriately substituted phenylenediamines, are described. E. S.

Diazo Compounds. I—Stability of Diazo Compounds in Concentrated Sulphuric Acid. II—Coupling in Concentrated Sulphuric Acid. Z. Allan. *Chem. Listy*, **43**, 30–32, 32–33 (1949): *Chem. Abs.*, **45**, 571 (25th Jan. 1951).

I—Kinetic measurements of the decomposition of 2:4-dinitrobenzenediazonium sulphate in various strengths of H_2SO_4 (by titrating the diazo compound with 2:3:6-aminonaphthalenedisulphonic acid) showed that it had maximum stability in 85% H_2SO_4.

II—In conc. H_2SO_4 aromatic amines do not couple with diazonium compounds, but certain phenols and naphthols couple smoothly. A general rule was established that in alkaline medium phenols couple, in acid medium amines, and in conc. H_2SO_4 phenols. C. O. C.

Rates of Oxidation of Azonaphthalenes. G. M. Badger and G. E. Lewis. *Nature*, **167**, 403–404 (10th March 1951).

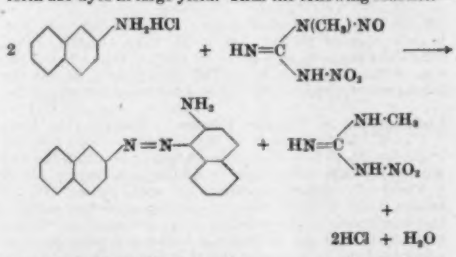
As a preliminary study in an investigation of the carcinogenic properties of certain azo compounds, the rates of oxidation of azobenzene and the three azonaphthalenes (1:1′, 1:2′, and 2:2′) with perbenzoic acid are examined. The reaction is shown to be bimolecular—

$$R{\cdot}N{:}N{\cdot}R + C_6H_5{\cdot}COOOH \rightarrow R{\cdot}\overset{\uparrow}{\underset{O}{N}}{:}N{\cdot}R + C_6H_5{\cdot}COOH$$

Azoxy compounds are obtained and the rate constants calculated. 1:1′-Azonaphthalene is attacked slowly; azobenzene more rapidly; 1:2′ and 2:2′-azonaphthalenes most rapidly, and at the same rate. It is supposed, therefore, that in 1:2′-azonaphthalene it is the N directly attached to the 2′-position that is oxidised, and the results are regarded as providing additional experimental evidence for the greater conjugating ability of the 1- over the 2-position in naphthalene. J. W. B.

New Method for the Preparation of Azo Dyes. E. Lieber and K. Parker. *J. Amer. Chem. Soc.*, **72**, 5779–5781 (Dec. 1950).

Aromatic amine hydrochlorides react with nitrosoamines of the type of *N*-methyl-*N*-nitroso-*N*′-nitroguanidine to form azo dyes in large yield. Thus the following reaction—



gives a 95% yield of the dye. C. O. C.

Oxazole Derivatives. V. K. Kuskov. *J. Gen. Chem.* (*U.S.S.R.*), **21**, 152–155 (Jan. 1951).

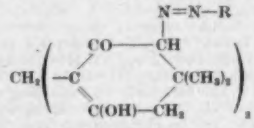
The anhydride of hippuric acid, formed when a soln. of the acid in acetic anhydride is heated, is 5-hydroxy-2-phenyloxazole. It couples with diazotised amines, but only very active components, such as *p*-nitroaniline, give a reasonable yield of azo dye, owing to the simultaneous rapid reversion of the anhydride to hippuric acid. Diazotised aniline is too inactive to give a product by this method, but the required dye can be obtained in good yield by adding diazoaminobenzene to a soln. of hippuric anhydride in a mixture of acetic anhydride and acetic acid. The dyes react readily with ammonia with rupture of the oxazole ring and formation of a colourless substance. A. E. S.

Specificity and Mechanism of the Hunter Reaction for Ergothioneine. A. Lawson, H. V. Morley, and L. I. Woolf. *Nature*, **167**, 82–83 (13th Jan. 1951).

Reaction with buffered diazotised sulphanilic acid followed by 10N-NaOH is applied to a number of 2-mercaptoiminazole derivatives. Only ergothioneine, 2-mercaptourocanic acid, and 4-phenyl-2-mercaptoiminazole give a deep magenta colour. Mercaptourocanic acid on filter paper when sprayed with mixed diazotised sulphanilic acid–sodium acetate–carbonate reagent (pH 9·4) gives an orange-red, and ergothioneine a lemon-yellow, product. On spraying with 10 N-NaOH the mercaptourocanic acid spot turns magenta crimson at once; the ergothioneine after 10 min. The magenta is an indicator, turning yellow with acids. A reaction mechanism is suggested for ergothioneine. J. W. B.

Azoformaldimethone Dyes. M. V. Kowjalgi and B. H. Iyer. *Current Sci.* (India), **19**, 210 (1950): *Chem. Abs.*, **45**, 863 (25th Jan. 1951).

Methylenebismethone couples readily with diazonium compounds to give dyes of probable formula—



Examples prepared were R = C_6H_5, vermilion; *p*-Br-C_6H_4, red; *o*-tolyl, red; *p*-xylyl, red; 2:3-xylyl, red; 1-naphthyl, brownish red; 2-naphthyl, red–violet. C. O. C.

Problem of Thermochromism—an Example of a True Valency Tautomerism. W. Theilacker, G. Kortüm, and G. Friedheim. *Chem. Ber.*, **83**, 508–519 (1950): *Chem. Abs.*, **45**, 1396 (25th Feb. 1951).

The ethylene ⇌ betaine theory of Schönberg *et al.* for the explanation of the thermochromism of dianthrone, according to which the C atom of the betaine system has in one case a negative and in another a positive charge, is unsatisfactory. Dianthrone and dixanthylene have an absorption band in the visible spectrum which becomes more intense as the temperature rises. This thermochromism is reversible, and is due to a thermodynamically dependent equilibrium between two different molecular states that change reversibly. It is the first experimentally proved case of valency tautomerism. Various possible states of the molecules are discussed. C. O. C.

Addition Reactions and Wagner–Meerwein Rearrangements in the Indoxyl Series. B. Witkop and J. B. Patrick. *J. Amer. Chem. Soc.*, **73**, 713–716 (Feb. 1951).

β-Hydroxyindolenines, indolones, and indoxyl derivatives, the intermediates in the oxidation of certain indole compounds, show a remarkable ability of adding nucleophilic elements to their reactive >C:N– double bond. Lithium aluminium hydride not only reduces disubstituted ψ-indoxyl derivatives, formed from methylketol and indole by this mechanism, but also effects migration of the substituent having the greater migratory aptitude. This rearrangement can be used for the structural elucidation of indoxyl compounds of unknown constitution. C. O. C.

Azomethin Dyes. I—Colour and Constitution of Pyrazolone Azomethin Dyes. G. H. Brown, B. Graham, P. W. Vittum, and A. Weissberger. *J. Amer. Chem. Soc.*, **73**, 919–926 (March 1951).

Azomethin dyes were prepared from 2-amino-5-diethylaminotoluene and twenty-six pyrazolones, and their absorptions determined in three solvents covering a range of dielectric constant. The absorption data are explained by assuming that the two absorption bands occurring in the visible spectrum are *x*- and *y*-bands, the effects of structural changes in the pyrazolone nucleus on these bands being explained qualitatively in terms of the resonance systems involved. The *x*-band (λ_{max} ca. 530–550 mμ.) seems to be associated with excitation involving large contributions from structures in which the pyrazolone 2-nitrogen atom is negatively charged, while the *y*-band (λ_{max} ca. 440–450 mμ.) is associated with excitation involving structures in which the negative charge is carried largely by the carbonyl O atom. Polarisation of the 1:5-lactam group of the pyrazolone ring and the steric arrangement of the dye molecule are important factors in determining absorption. C. O. C.

Preparation of Carbocyanine Dyes in Propyl Alcohol. H. Wührmann. *Science et Ind. phot.*, **21**, 441 (1950): *Chem. Abs.*, **45**, 1444 (25th Feb. 1951).

A purer product and better yields are obtained when preparing carbocyanine dyes if the pyridine usually used as the solvent is replaced by propanol. C. O. C.

Excited Electronic Levels in Conjugated Molecules. IV—Symmetrical Cyanine Dyes. W. E. Moffitt. *Proc. Phys. Soc.*, **63A**, 700–707 (1950): *Chem. Abs.*, **45**, 1421 (25th Feb. 1951).

Topics in the electronic theory of the colour of symmetrical cyanine dyes are discussed by resonance formalism. Conclusions for the formamidinium ion are confirmed by use of the molecular orbital method. Modifications in the qualitative symbolism of colour theory are proposed. The formamidinium ion is discussed in detail. Bond orders, charge distribution, and effect of replacing –CH= by –N= are discussed. C. O. C.

Colour and Constitution. IX—Absorption of Cyanines derived from 3-Methylisoquinoline; a Rule relating Basicity and Absorption in Symmetrical Cyanines. L. G. S. Brooker, F. L. White, and R. H. Sprague. *J. Amer. Chem. Soc.*, **73**, 1087–1093. **X—Reactivity of the Methyl Group in Quaternary Salts of 3-Methylisoquinoline.** L. G. S. Brooker and F. L. White. *Ibid.*, 1094–1097 (March 1951).

IX—The exceptionally high basicity of the 1-ethyl-3-*iso*quinoline nucleus, predictable from comparison of the resonance structures of the uncharged and positively charged forms of the ring, is confused by the unprecedentedly high "deviation in λ_{max}" shown by 2-ethyl-3-*p*-dimethylaminostyryl*iso*quinolinium iodide and another highly unsymmetrical dye. 2:2′-Diethyl-3:3′-*iso*quinocarbocyanine iodide (derived from 3-methyl*iso*quinoline ethiodide) absorbs at much shorter wavelengths and with much lower ε_{max} than the isomeric 1:1′-diethyl-2:2′-(quino)carbocyanine iodide. This relationship may be traced to the extremely high basicity of the 3-*iso*quinoline ring. Comparison of absorptions of various symmetrical cyanines leads to the rule—For symmetrical cyanines in which the nuclei are weakly or moderately basic, increasing the basicity of the nuclei will deepen the colour (though allowance must be made for other factors, such as the effect of more "extrachromophoric" conjugation in one dye than another). For symmetrical cyanines in which the nuclei are very strongly basic, increasing the basicity of the nuclei still further will lighten the colour. 2:2′-Dimethyl-3:3′-*iso*quinocarbocyanine iodide absorbs at shorter wavelengths by 340 A. than the 2:2′-diethyl dye. This relationship, unique in the literature of cyanine dyes, has not yet been satisfactorily explained.

X—The 3-methyl group in 2-alkyl-3-methyl*iso*quinolinium salts condenses with *p*-dimethylaminobenzaldehyde and some other aldehydes in presence of piperidine to give high yields. Attempts to carry out a variety of other condensations leading to cyanine dyes were unsuccessful, although very low yields of symmetrical carbocyanines could be obtained using more drastic conditions than usual. This lack of success is probably due in large measure to the relative difficulty of liberating the intermediate methylene bases by removing the elements of acid from the quaternary salts, ascribable to the exceptionally high basicity of these methylene bases. C. O. C.

Investigations of Benzo-1:4-thiazine Derivatives. I—Quaternary Salts of Benzo-1:4-thiazine and its Derivatives. II—Cyanine Dyes of the Benzo-1:4-thiazine Series. III—Condensation of Quaternary Salts of Benzo-1:4-thiazine and its Derivatives with Aldehydes. A. I. Kiprianov and Z. N. Pazenko. *J. Gen. Chem. (U.S.S.R.)*, **21**, 156–163, 163–170, and 170–174 (Jan. 1951).

The hitherto unknown quaternary salts of a number of derivatives of benzo-1:4-thiazine were prepared by the condensation of α-halogenoketones with *N*-alkyl- or *N*-aryl-*o*-aminothiophenols. The usual method of preparation from the free base and an alkyl halide or other ester generally leads to resinification, but the authors succeeded

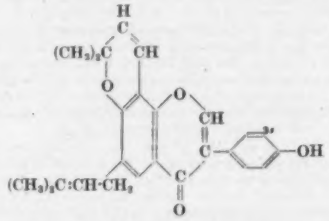
in isolating some quaternary salt in very low yield from the products of reaction between 3-methylbenzthiazine and dimethyl sulphate. A quaternary salt from benzthiazine itself was obtained by condensing *N*-methyl-*o*-aminothiophenol with ethylene dibromide. The quaternary salts of benzthiazine and its derivatives readily isomerise into the corresponding salts of 2-alkylbenzthiazoles. They also react readily to give a series of cyanine dyes, of which only one member has been described previously. Scarlet monomethin dyes are obtained by treating a quaternary salt of a 3-methylbenzthiazine with a quaternary salt of a 3-methylthiobenzthiazine. Red thiocarbocyanines are obtained by heating a soln. of a quaternary salt of a 3-methylbenzthiazine with orthoformic ester; a violet isomer, derived from benzthiazole, is formed in a side-reaction. In all, nine new cyanine dyes, including one pentamethincyanine, were prepared. Their absorption maxima are recorded. The quaternary salts of 3-methylbenzthiazine and its derivatives readily condense with *p*-dimethylaminobenzaldehyde, giving the corresponding styryl dyes (red to violet). The quaternary salt of unsubstituted benzthiazine condenses with aromatic aldehydes at the methylene group in the 2-position. A. E. S.

Detection of Intramolecular Hydrogen Bonds. V. V. Perekalin. *J. Gen. Chem.* (*U.S.S.R.*), **21**, 129–132 (Jan. 1951).

A consideration of data regarding a large number of lake-forming organic substances shows that in every case the free substance contains an intramolecular hydrogen bond. The examples given are aromatic substances containing OH or NH_2 situated *ortho* or *peri* to an electrophilic group such as carboxyl or azo, and also aliphatic substances containing similar groups oriented 1:3. It is suggested that lake-formation, particularly with boron acetate, may be used as a qualitative reaction for the presence of an intramolecular hydrogen bond. It is not true, however, that the presence of an internal hydrogen bond always indicates the possibility of lake-formation. A. E. S.

Osage Orange Pigments. XII— Synthesis of Dihydro-*iso*osajin and Dihydro*iso*pomiferin [Structures of Osajin and Pomiferin]. M. L. Wolfrom and B. S. Wildi. *J. Amer. Chem. Soc.*, **73**, 235–241 (Jan. 1951).

Various syntheses of dihydro*iso*osajin and dihydro*iso*pomiferin confirm that the *iso*flavone pigments osajin and pomiferin present in the fruit of the osage orange, *Madura pomifera* Raf., have the following structure—



3′ in the case of osajin being H and in the case of pomiferin OH. C. O. C.

Colour Reactions between Clay Minerals and Root Secretions. P. S. Nutman. *Nature*, **167**, 288 (17th Feb. 1951).

Red clover plants are grown in presence of bentonite and of fullers' earth, both of which minerals show colour reactions near the root. Bentonite → blue-green → purple-brown on drying → jade green on acidifying → colourless with alkali; the colour is fast to oxidising and reducing agents, and to moderate leaching with aqueous or organic solvents. J. W. B.

Complete Synthesis of β-Carotene. P. Karrer and C. H. Eugster. *Compt. rend.*, **230**, 1920, 1921 (1950): *Chem. Abs.*, **45**, 1552 (25th Feb. 1951).

β-Carotene has been synthesised by treating 4-octene-2:7-dione with 2 mol. of the Grignard derivative of 6-(1′:1′:5′-trimethyl-5′-*cyclo*hexen-6′-yl)-4-methyl-5-hexen-1-yn-4-ol to yield a mixture of isomeric tetrols. This mixture (1 g.) was then reduced over Pd, and the product dehydrated with *p*-toluenesulphonic acid to yield β-carotene (30 mg.) with a small quantity of other carotenoids. C. O. C.

Four Centuries of the History of Melanin. M. L. Dufrénoy and J. Dufrénoy. *Scientia*, **85**, 272–277 (1950): *Chem. Abs.*, **45**, 1174 (10th Feb. 1951).

Discussion; no references. C. O. C.

Development and Preparation of "Core" Pigments. B. F. H. Scheifle. *Farben, Lacke, Anstrichstoffe*, **4**, 414–417 (1950): *Chem. Abs.*, **45**, 2228 (10th March 1951).

"Core" pigments are obtained by depositing the pigment upon an inert substrate or "core", which achieves saving of pigment without the undesirable effects of adding inerts. They can be made in several ways. Pigments, primarily lead or its compounds, are deposited on Al, Zn, derivatives of Al, Ba, Ca, or Mg, SiO_2, SiC, talc, graphite, or iron oxides by one of the following methods— (*a*) precipitation under conditions retarding crystal growth (e.g. high temperature or concentration, violent agitation, presence of protective colloids); (*b*) fixation with high-molecular reagents (soaps, resinates, organic acids, phthalic anhydride); (*c*) adsorption (e.g. $Pb(NO_3)_2$ soln. is milled with $BaSO_4$, and NH_4HCO_3 is sprayed on the paste in presence of gelatin); (*d*) plating (e.g. Pb on Al or Zn powder used as the cathode); (*e*) vaporising or atomising metallic vapour on the inert material spraying in as a chilling agent; (*f*) cocrystallisation (e.g. $PbCrO_4$ with $BaSO_4$ or $CaSO_4$); (*g*) calcining (e.g. $BaSO_4$ or other inerts made into a paste with $Pb(NO_3)_2$, calcining to PbO, and oxidising to Pb_3O_4; (*h*) double decomposition (e.g. the inert is pasted with Na_2CrO_4 or Na_2SO_4 and then treated with lead or zinc acetate); etc. C. O. C.

Zinc Oxide of Low Lead Content for making Zinc Yellow. H. Maucke. *Farbe und Lack*, **56**, 446 (1950): *Chem. Abs.*, **45**, 876 (25th Jan. 1951).

Two methods are given for preparing zinc yellow from ZnO containing about 5% Pb (as basic sulphate)— (1) Boil Zn scrap (26 kg.) with 66°Bé. H_2SO_4 (41 kg.), and next day add $CaOCl_2$ (1 kg.) to the solution. Separately slurry ZnO (57·5 kg.) by boiling in water for 30 min., strain, and to the cooled slurry slowly add $K_2Cr_2O_7$ (115 kg.) in aq. soln. while stirring well. After stirring for 10 hr., add the first ($ZnSO_4$) soln. and stand for 14 hr. Decant the excess dichromate soln., and wash the product (189 kg. of $3(ZnCrO_4).K_2Cr_2O_7$) twice with water. (2) Slurry ZnO (55 kg.), add 66°Bé. H_2SO_4 (26·5 kg.), stand for 50 min., add $K_2Cr_2O_7$ (55 kg.) dissolved in water, and stir for a prolonged period. The product (132·5 kg. of $3(ZnCrO_4)$, $K_2Cr_2O_7$) is washed twice with water. Precipitation is best at a little above 50°c. C. O. C.

Velocity of Formation of Red Lead in Thermal Oxidation of Red and Yellow Litharge. W. Gruhl. *Z. Erzbergbau und Metallhüttenw.*, **3**, 319–325 (1950): *Chem. Abs.*, **45**, 2229 (10th March 1951).

The speed of reaction is determined by the concentration of PbO in the oxide mixture. The oxidation velocity of red PbO increases with increase of temperature, but that of yellow PbO decreases. This is due to difficulties in formation of Pb_3O_4 nuclei, which were overcome by inoculation. The increasing end value of the oxidation curves with rising temperature is attributed to increase of solubility of oxygen in red Pb_3O_4 with rising temperature. C. O. C.

Relationship between Colour and Factors influencing the Preparation of Ferrite. D. A. Francile. *Rev. Facultad Cienc. quím.* (*Univ. nacl. La Plata*), **22**, 301–307 (1947) (published 1949): *Chem. Abs.*, **45**, 877 (25th Jan. 1951).

The colour of the pigment depends upon the concn., class, and initial pH of the gel, the concn. of $FeSO_4$ in which the gel is suspended, and the $Fe_2(SO_4)_3$ content of the $FeSO_4$. C. O. C.

Carbon Black. G. Kiddoo. *Chem. Engineering*, **58**, (3), 104–108 (March 1951).

A description of the channel, combustion furnace, and thermal decomposition processes together with a review of the carbon black industry in the U.S.A. and the indication of future trends. C. O. C.

Production of Metal Powders by Electrolysis. I. Jordan. *A. B. M.* (*Bol. Assoc. brasil. Metais*), **6**, 151–178 (1950): *Chem. Abs.*, **45**, 477 (25th Jan. 1951).

Metal powders can be satisfactorily obtained by electrolysis. For Cu, 7–11 amp./sq. dm. at room temp., a stainless steel cathode, and 50 g. $CuSO_4.5H_2O$ and 150 g. H_2SO_4 per litre can be used. Less $CuSO_4$ gives a finer powder. It must be completely washed, then dried quickly below 120°c. For Sn, 20 g. $SnCl_2.2H_2O$ and 250 g. NaOH per litre are used at 5 amp./sq. dm. and room temp.; these conditions give 95% cathode efficiency and 50% through 325 mesh. Rapid drying is unnecessary. For Zn, 45 g. $ZnSO_4$ and 230 g. NaOH per litre are used at 13 amp./sq. dm. and 35°c., yielding 72% cathode efficiency and 19% through 325 mesh. The electrolyte needs cooling. C. O. C.

Bronze Pigments. J. Breidenfeld. *Farbe und Lack*, **56**, 429–435 (1950): *Chem. Abs.*, **45**, 877 (25th Jan. 1951).

Metallic pigments can be divided into (i) bronzes (greenish-yellow to reddish alloys of 65–85% Cu and 35–15% Zn); (ii) aluminium bronze (golden yellow, 90% Cu, 10% Al); (iii) copper bronzes (heat-oxidised Cu of various hues— orange, fire red, bright red, brown, lilac); (iv) "patent" bronzes (Zn or Al powder dyed with organic dyes); (v) Au, Ag, Sn, Zn, and imitation Au or Ag pigments. The current process of producing metallic pigments is to melt foil waste or the components of the alloy, together with a little Al, Mg, or a borate (to prevent oxidation), and cast the molten metal on water-cooled rotating discs which throw off the cooled metal as foil. This is then pounded in hammer mills (or in the case of Al shredded) in presence of lubricants (stearic acid, lard, palm oil), and the pigment air-floated or screened, and finally polished with a lubricant (usually stearic acid) in drums with rotating brushes to give it gloss, weather resistance, and leafing power. A recent development is to treat the foil in ball mills in a mineral thinner containing the lubricant; this produces pastes which are superior in colour and leafing power and safe from dust explosions. Leafing, and factors affecting it, as well as a quantitative test for leafing, are discussed. Excellent resistance to exposure has been obtained with a paint based on Al and elementary Si pigments. A paint made of Al pigment in a silicone vehicle had excellent stability above 400°c. C. O. C.

PATENTS

Derivatives of Succinic Esters — Intermediates. United States Rubber Co. *B.P.* 650,145.

Dialkyl α-bromo-β-trichloromethylsuccinates react with olefinic compounds CH_2:CAB with elimination of HBr to give compounds—

$$\begin{array}{l} Cl_3C\cdot CH\cdot COOAlk \\ \quad\quad\quad\quad | \\ B\cdot CA{:}CH\cdot CH\cdot COOAlk \end{array}$$

(A = H or Alk; B = H or subst. or unsubst. Alk), which are intermediates for dyes, plasticisers, etc. Thus with 1-octene and the dimethyl ester the product is 1:1:1-trichloro-2:3-dicarbomethoxy-4-undecene (A = H; B = C_8H_{17}). E. S.

Diazotype Compositions containing Ethylene Oxide Derivatives of Amino Diazo Compounds. General Aniline & Film Corpn., W. H. von Glahn, L. N. Stanley, and G. T. Parker. *U.S.P.* 2,528,460.

Compounds of formula—

$$NH_2\cdot R^2\cdot NR^1\cdot[CH_2\cdot CH_2\cdot O]_m\cdot X$$

or

$$NH_2—R^2—N\begin{matrix}[CH_2\cdot CH_2\cdot O]_n\cdot X \\ [CH_2\cdot CH_2\cdot O]_n\cdot X\end{matrix}$$

($m > 1$; n = a whole number; R^1 = Alk, hydroxyalkyl, alkoxyalkyl, Ar, aralkyl, or acyl; R^2 = an aromatic radical containing no alkyl substituent of > 3 C; X = H, aliphatic, aromatic, or heterocyclic radical, or acyl) are light-sensitive, and when developed with an azo component yield bright dark images on a clear white background, the images being fast to washing and having great permanency. C. O. C.

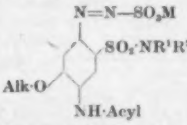
Acylated Aminophenols as Azo Coupling Components. General Aniline & Film Corpn., W. H. von Glahn, and L. N. Stanley. *B.P.* 650,046.

Compounds of formula—

(R^1 = H, Alk, or hydroxyalkyl; X = CO or SO_2; R^2 = aliphatic, aromatic, heterocyclic, amino, or alkylamino radical; Y = O·SO_2H, SO_2H, NH_2.HCl, $N(CH_3)_2$.HCl, NH·CH_2.HCl, NH·C_2H_4.HCl, or $N(C_2H_5)_2$.HCl) are washfast and stable azo coupling components for use in two-component diazotype layers. C. O. C.

Diazosulphonates suitable as Components for Magentas for Colour Photography. Société Anonyme de Matières Colorantes et Produits Chimiques Francolor. *B.P.* 651,042.

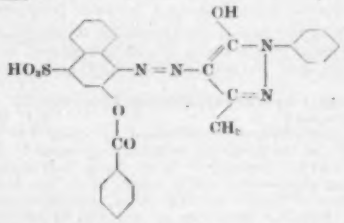
Compounds of formula—



(R^1 and R^2 = Alk, *cyclo*alkyl, aryl, or aralkyl; M = equivalent of a metal conferring solubility in water) in conjunction with an arylide of 2-hydroxy-3-naphthoic acid are excellent components for the magenta used in colour photography. C. O. C.

Dyeing Wool, etc. with *O*-Acylated ωω'-Dihydroxymonoazo Dyes in presence of Nickel or Cobalt Salts. Ciba Ltd. *B.P.* 650,127.

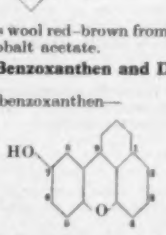
The mono- or di-*O*-acylated ωω'-dihydroxymonoazo dyes of *B.P.* 622,862, 624,798, and 636,681 (cf. J.S.D.C., **66**, 451 (Aug. 1950)) can be applied to animal fibres, nylon, etc. from a neutral or weakly acid bath in presence of salts of nickel or, preferably, cobalt. The preferred dyes are mono-*O*-acylated derivatives of monoazo compounds of the type aminonaphtholmonosulphonic acid→a 3-methyl-5-pyrazolone. Thus by esterifying with benzoyl chloride the monoazo compound 1-amino-2-naphthol-4-sulphonic acid→1-phenyl-3-methyl-5-pyrazolone, the monobenzoyl compound—



is formed. It dyes wool red-brown from a bath containing acetic acid and cobalt acetate. E. S.

7-Hydroxy-1:9-Benzoxanthen and Derivatives. Ciba Ltd. *B.P.* 649,685.

7-Hydroxy-1:9-benzoxanthen—



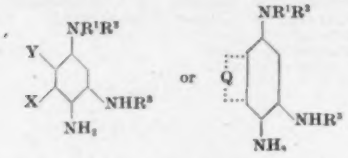
and its substitution products are made by treating benzoquinone in cold aqueous solution with a diazotised 1-chloro-8-aminonaphthalene. Nitrogen is liberated in this reaction, and the resulting 1-chloro-8-benzoquinonylnaphthalene reduced with iron and HCl in ethanol, to the corresponding quinol. Cyclisation by elimination of HCl is finally carried out by heating at 200°c. with NaOH containing a small amount of water. The product is separated by acidifying a filtered aqueous solution of the melt. R. K. F.

Phthalocyanine Pigments. Lewis Berger & Sons Ltd. *B.P.* 649,911.

Phthalocyanines for use as pigments are dissolved in 8–11 times their weight of sulphuric acid, and the resulting solution is poured into cold water to give a solution of < 40% H_2SO_4 which does not exceed 30°c. during the dilution. A wetting agent, e.g. Turkey Red oil, may be present in the water, and the resulting suspension may later be boiled. R. K. F.

Azine Dye Components. General Aniline & Film Corpn., W. A. Schmidt, and R. C. Gunther. *U.S.P.* 2,527,379.

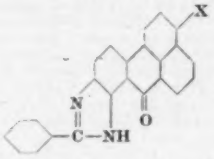
Compounds of formula—



(R^1 = H or Alk; R^2 = aliphatic or aromatic radical; R^3 = an aliphatic or aromatic radical having a ring C directly linked to the N atom, which C atom is attached to > 1 H atoms; X and Y = H, Alk, sulpho, or carboxy; Q = atoms to complete a 6-membered isocyclic ring) are used as colour-forming developers to produce azine dyes. C. O. C.

Benzanthrone-8:9-*C*-phenyliminazole and its Monobromo Derivative. General Aniline & Film Corpn. and W. Schmidt-Nickels. *U.S.P.* 2,527,380.

Benzanthrone-8:9-*C*-phenyliminazole and its monobromo derivative of probable formula—



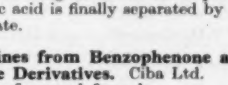
(X = H or Br) are useful intermediates for vat dyes. They are prepared by the action of iron and glycerol in strong sulphuric acid on anthraquinone-1:2-*C*-phenyliminazole. C. O. C.

6-Amino-1-hydroxynaphthalene-2-carboxylic Acid. Ciba Ltd. *B.P.* 649,007.

6-Amino-1-hydroxynaphthalene is dissolved in aq. NaOH, and the resulting solution evaporated to dryness under reduced pressure. After finely pulverising, the resulting alkali-metal salt is heated in an iron autoclave with carbon dioxide at 145–150°c. and 13–15 atm. for 24 hr. Resinous impurities are removed by reducing the alkalinity and filtering a solution of the product in water. The carboxylic acid is finally separated by acidifying the resulting filtrate. R. K. F.

Phthalocyanines from Benzophenone and Diphenyl Sulphone Derivatives. Ciba Ltd. *B.P.* 649,652.

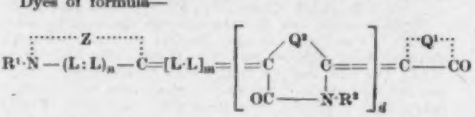
Compounds of general formula—



(X = CO or SO_2; Y = CN, COOH, or a group convertible to CN by fusing with urea) are heated in a high-boiling solvent in presence of a cuprous halide, sodium hydroxide, if necessary urea, and a catalyst, e.g. ammonium molybdate. Thus 3:3′:4:4′-tetracyanobenzophenone is heated at 200–210°c. for 15 hr. with cuprous chloride and sodium hydroxide in nitrobenzene. The resulting greenish-blue pigment may be sulphonated in 25% oleum at 160°c. to give a cotton dye or brominated to yield a greener pigment. R. K. F.

Acid *mero*Cyanine Dyes. Eastman Kodak Co., L. G. S. Brooker, and F. L. White. *U.S.P.* 2,526,632.

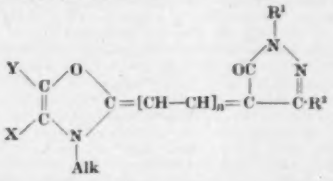
Dyes of formula—



(R^1 and R^2 = subst. or unsubst. Alk or Ar; L = subst. or unsubst. methin; n = 0 or 1; m and d = 0–2; Q^1 = atoms necessary to complete a five-membered heterocyclic ring; Q^2 = O, S, or NR^3; R^3 = subst. or unsubst. Alk or Ar; Z = atoms necessary to complete a five- or six-membered heterocyclic ring) when used as photographic sensitisers leave less stain in the final processed material. C. O. C.

***mero*Cyanine Dyes from 2-Methyloxazoles or 2-Methylbenzoxazoles and Pyrazolones containing an Acid Group.** Eastman Kodak Co., H. R. Silberstein, and B. H. Carroll. *U.S.P.* 2,527,583.

Dyes of formula—



(X and Y = H, C_6H_4, or together the atoms necessary to complete an aromatic ring of the benzene or naphthalene series; R^1 = H or Ar containing an acid group; R^2 = Alk or COOH; n = 1 or 2) are useful as photographic filters which are irreversibly bleached by sulphites. C. O. C.

Separating Carotene, Xanthophyll, Tocopherol, and Sterols from Green Plant Materials by Molecular Distillation. U.S. Secretary of Agriculture and M. E. Wall. *U.S.P.* 2,527,602.

The material is extracted with a low-boiling organic solvent. This extract is then mixed with a high-boiling solvent, and the mixture molecularly distilled to yield carotene-rich and carotene-free fractions respectively. C. O. C.

Pelleting Carbon Black. Phillips Petroleum Co. and W. W. Crouch. *U.S.P.* 2,526,120.

Aluminium and Other Powder with Leaf Structure or Needle Form. Carlfors A.-B. *B.P.* 650,818.

The raw powder is blown into a centrifugal separating chamber, where it flows circularly around a separate confined space in the chamber. Another stream of air or other gas is led into the chamber, and is directed radially outward into the gas and powder stream, the undesired fractions of the powder separated centrifugally from the gas and powder stream being withdrawn from the separating chamber. That fraction of the powder which is desired remains in the gas and powder stream entering peripherally the confined space, and is withdrawn from the centre of that space and passed to a filter. This enables powder of any desired surface area per unit of weight to be separated. C. O. C.

Mica-coated Metallic Pigments. Tainton Co. and E. T. Clayton. *U.S.P.* 2,528,034.

A flake metal pigment is ground with < 5% of its weight of mica beneath the surface of a solvent for oil which is inert to the metal and contains a natural organic drying oil capable of absorbing atmospheric oxygen at room temperature. This yields a bright, highly reflective pigment, which is unaffected by oxidation when exposed to weathering in a paint film. C. O. C.

Organic Esters and Nitriles containing an Active Methylene Group as Azo Coupling Components in Diazotype Printing. General Aniline & Film Corpn., W. H. von Glahn, and L. N. Stanley. (IX, p. 250.)

V—PAINTS; ENAMELS; INKS

Study of Pigment Dispersion—III. New York Paint & Varnish Production Club. *Official Digest Federation Paint & Varnish Production Clubs*, No. **311**, 977–1000: *Amer. Paint J.*, **35**, No. 8-A (Convention Daily), 9–16 (1950): *Chem. Abs.*, **45**, 1782 (25th Feb. 1951).

A discussion divided into two parts—(1) Report on data obtained from investigations of paste mixing and roller grinding, the subdivisions including—(i) effect of paste temperature at time of grinding, (ii) effect of mixing, and grinding efficiency of volatile solvent in mixing and grinding liquid, (iii) efficiency of an alkyd resin compared with other vehicles as mixing and grinding liquids. (2) Report on factors influencing most efficient use of pebble and ball mills, subdivisions including—(i) maximum grinding efficiency is obtained with the smallest pebbles that show the proper cascading effect in the mill; (ii) optimum pebble size is affected by the sp. gr. of the grinding media; (iii) a technique for formulation of the pebble mill grinding base predicted to give optimum pebble mill working is given; (iv) this technique gave grinding efficiencies far surpassing those obtained by other means; and (v) some exceptions are listed. C. O. C.

Dispersion of Pigments in Preparation of Nitrocellulose Lacquers. J. Creasy. *Paint Technol.*, **15**, 385–388 (1950): *Chem. Abs.*, **45**, 1784 (25th Feb. 1951).

In these lacquers, degree of dispersion affects colour, gloss, hiding power, flow, weathering, and storage properties. The various methods of grinding are designed more to break up pigment aggregates than to reduce pigment particle size. In the Weiner–Pfleiderer mixer, with the sigma-shaped blade, breaking down of the pigment aggregate is accomplished by the shearing action occurring when pigment is worked in a stiff plastic mass. In this method, use of water-wet cellulose nitrate gives better colour (especially with blacks and blues) than alcohol-wet cellulose nitrate. When the proper degree of dispersion has been achieved, the plastic mass of pigment and cellulose nitrate may be either sheeted and broken into chips or thinned carefully with solvents and converted into lacquer. Water is removed as it exudes from the mass during the dispersion. In dispersing carbon black, use of copper butyl phthalate (10% on pigment weight) is advantageous. Photomicrographs reveal the better dispersion obtained with the W.–P.-type mixer compared with roller and ball mills. C. O. C.

Result of Accelerated Yellowing Tests on White Enamels. Baltimore Paint & Varnish Production Club. *Official Digest Federation Paint & Varnish Production Clubs*, No. **310**, 815–826: *Amer. Paint J.*, **35**, No. 7-A (Convention Daily), 14–18 (1950): *Chem. Abs.*, **45**, 1786 (25th Feb. 1951).

Exposure tests with four different pigment combinations in a soya alkyd (pentaerythritol type) and linseed alkyd (glycerol type) vehicle indicate—(1) Yellow ratings obtained with a Hunter reflectometer by using the formula Yellowing $= A - B/G$ agree with visual ratings. (2) Exposure in a dark cabinet agrees closely with normal daylight exposure. (3) Ammonia atmosphere, high temperature, high temperature + humidity, and high temperature + sat. humidity + light promote rapid yellowing (3 days for 7 months' normal exposure, agreeing with long-time normal exposure). (4) Enamels containing ZnO were yellower at the start but had better colour retention than corresponding enamels containing no ZnO. (5) Enamels made with rutile TiO_2 are yellower than those made with anatase, but the extent of colour change is the same in both cases. C. O. C.

White Stoving Enamels. J. F. H. van Eijnsbergen. *Chem. Tech.* (Dordrecht), **6**, 33–36 (1950): *Chem Abs.*, **45**, 2230 (10th March 1951).

Five alkyd–urea–TiO_2 enamels have been investigated. The alkyd resins were castor-oil-modified containing 53% fatty acid (I), dehydrated castor-oil-modified containing 43% fatty acid (II), and non-drying, synthetic fatty acid-modified containing 43% fatty acid (III). Gloss decreased with increased temperature and time of stoving; II gave most and I least lowering of gloss. Increasing the proportion of I and decreasing that of III increased gloss. No combination containing III showed yellowing. Hardness increased with increasing proportion of urea resin and increased time and temperature of stoving; II gave the hardest and III the softest films. The Erichson No. (elasticity) decreased with temperature and time of stoving and with decreasing proportion of alkyd resin; at 120°c. it was lowest with II and highest with I. C. O. C.

Effect of Zinc Oxide on Architectural White Alkyd Enamels. Western New York Paint & Varnish Production Club. *Official Digest Federation Paint & Varnish Production Clubs*, No. **310**, 806–814: *Amer. Paint J.*, **35**, No. 7-A (Convention Daily), 8–12, 14 (1950): *Chem. Abs.*, **45**, 1783 (25th Feb. 1951).

Results obtained with seven representative alkyd resins indicate—(1) Use of 2·5% ZnO graded for alkyd enamel gives greatly improved colour retention without adversely affecting gloss retention. (2) With 5–10% ZnO gloss retention is affected without improved colour retention. (3) When ZnO was incorporated, the viscosity increased on ageing independently of the amount added. (4) ZnO improved the non-setting properties of all enamels. (5) No seeding of enamels was evident after one year. (6) ZnO had no effect on rate of drying. C. O. C.

Bronze Pigments and Vehicles. C. Boller and U. Lichthardt. *Farbe und Lack*, **56**, 479–485 (1950): *Chem. Abs.*, **45**, 2229 (10th March 1951).

Ageing is necessary to bring out leafing ability fully, the effect of this ageing being due not to "after-oxidation" but to a physicochemical adsorption of the leafing agent on to the pigment particles. Thus, after ageing, stearic acid cannot be completely extracted as it can from the fresh pigment. Aluminium settles and cakes less in thin than in viscous vehicles, and leafing is better in vehicles having high surface tension than those of low surface tension. When 2-g. samples of five commercial Al pigments were shaken in test tubes with 15 ml. of white spirit, benzene, xylene, decahydronaphthalene, 1:2:3:4-tetrahydronaphthalene, chlorotoluene, or CCl_4, they did not settle out completely in 130 min.; only one of the pigments left the supernatant liquor clear. The sediment built up from the bottom upwards. When the pigments were shaken up with butanol, ethanol, turpentine, butyl acetate, and ethyl acetate, settling was rapid, from the top downward, and complete in 2 hr. Leafing is poor in the latter group of solvents, and settling is independent of sp. gr. In the first group, the pigments settled most slowly in 1:2:3:4-tetra- and deca-hydronaphthalene (biggest sediment volume), and settled least in chlorotoluene and CCl_4 (small sediment volume with most of pigment remaining suspended). Tests on various recipes for paints indicate that—the best vehicle for Al pigment should be low to moderate in acidity, mol. wt., and viscosity; Co drier is preferable; xylene, 1:2:3:4-tetrahydronaphthalene, and other aromatic hydrocarbons are most suitable as thinners; and the film should not be rapid-drying. C. O. C.

Hiding Power of Synthetic Iron Oxides. Toronto Paint & Varnish Production Club. *Official Digest Federation Paint & Varnish Production Clubs*, No. **310**, 850–862: *Amer. Paint J.*, **35**, No. 8-A (Convention Daily), 16–20 (1950): *Chem. Abs.*, **45**, 1782 (25th Feb. 1951).

A series of yellow and red oxides were measured for the amount of "show through" over black and white by means of a Hunter reflectometer. This measurement was plotted against the weight of pigment to give a hiding curve. Differences in brightness at equivalent hiding for batches of the same pigment were indicated by shift in the hiding curve in relation to the reflectance axis. To increase speed, a new electrical dipping machine was developed. Details of the improved procedure in measurement are given, and comparative data shown in curves. C. O. C.

Influence of Pigments on Corrosion-protection Effect of Paints. C. Kalauch. *Werkstoffe und Korrosion*, **1**, 400–404 (1950): *Chem. Abs.*, **45**, 2227 (10th March 1951).

Organic basic pigments of low swelling capacity are as effective as inorganic pigments in stopping corrosion of iron surfaces. The mechanism of their action in this respect is discussed. C. O. C.

PATENTS

Stabilised Solutions of Driers. Ferro Chemical Corpn., S. B. Elliott, and R. J. O'Hara. *U.S.P.* 2,528,429.

Addition of an acid of phosphorus containing an organic substituent or a salt of such an acid stabilises solutions of

driers to decomposition and also decreases their viscosity. C. O. C.

Counterlivering Agent in Red Lead Paint. R. B. Pollak. *U.S.P.* 2,526,771.

Not < 0·25% of a glycol ether or not < 1% of an alcohol added to red lead paint prevents livering or restores already livered paints. The glycol ether has the advantage over the alcohol that it does not thin the paint and so cause eventual settling out of the pigment. C. O. C.

Coating and Impregnating Compositions. Harvel Corpn. *B.P.* 650,787.

Compositions comprising a polymerised or thickened hydrocarbon ether of an Anacardiaceæ phenol (obtained from cashew nut shell liquid) and a non-drying glyceride oil are light in colour and resistant to sunlight. They give good gloss retention to materials, in which they are used, when exposed to weathering. C. O. C.

Natural Tannins. IV— Chebulagic Acid from Divi Divi. O. T. Schmidt and R. Lademann. (III, p. 239.)

Increasing the Adhesiveness and Resistance to Ageing of Polyvinyl Acetal Hot-melt Compositions. Monsanto Chemical Co., G. R. Sido, and J. F. Murphy. (III, p. 240.)

VI—FIBRES; YARNS; FABRICS

Chemical Attack on Polymeric Materials as modified by Diffusion. S. M. Katz, E. T. Kubu, and J. H. Wakelin. *Text. Research J.*, **20**, 754–760 (Nov. 1950).

The effect of diffusion on the rate of reaction of a reagent with a fibre is discussed, and equations are derived to show the magnitude of the effect. The results are confined to circumstances in which the diffusion is rapid but finite compared with the rate of the reaction. The application to experimental results is illustrated graphically, and figures are quoted from which results can be worked out. W. J. M.

Fibres and Fabrics [from the Viewpoint of the Rubber Industry]. J. W. Illingworth. *Annual Report on the Progress of Rubber Technology*, **23**, 36–43 (1949).

Review with 45 references. C. O. C.

Bound Water in the System Cellulose–Aqueous Salt Solution. J. Farrar, S. M. Neale, and G. R. Williamson. *Nature*, **167**, 524 (31st March 1951).

Separation and analysis of the phases of the system cellulose–alkyl halide solution shows that preferential adsorption of the solute is not in favour of the aqueous phase. The rise in apparent specific volume of the cellulose must be ascribed to some secondary effect, perhaps some action of the solute in reducing the adsorption compression or interpenetration between water and cellulose. Measurements of specific volume are therefore useless in the determination of "bound water", while determinations based on the take-up of water and solute from solutions of known concentration, which would give negative values if alkyl halides were used, are not generally significant if made with a particular solute. J. W. B.

Capillary and Imbibed Water in Assemblies of Moist Fibres. J. M. Preston, M. V. Nimkar, and S. P. Gundavda. *J. Textile Inst.*, **42**, T 79–T 90 (Feb. 1951).

Consideration of theoretical aspects of water retention in fibrous capillary spaces is followed by attempts to fit practical data with the theoretically derived equations. Effects of varying surface tension and centrifugal force on the water imbibition of Muir sintered glass centrifuge filters and on resin-free glass fibres are studied. Results are as predicted, though fibres show some variation according to whether they are centrifuged in hank form or loose on a perforated plate. Measurements on viscose and other man-made fibres are made varying both surface tension and centrifugal force, while effects of fibre swelling, various aftertreatments, pH value, orientation of filaments, and cuticle tendering of cotton are also investigated. In general, agreement with the theoretical equation is again satisfactory. J. W. B.

Factors which influence the Kinetics of Cellulose Reactions. E. Heuser. *Text. Research J.*, **20**, 828–837 (Dec. 1950).

The reactions of the hydroxyl groups in cellulose are believed to be governed by (*a*) the physical structure (microscopic and sub-microscopic) and (*b*) the chemical nature of its hydroxyl groups, which in turn is determined by their position in the glucose residue. One or other of these effects is likely to predominate, depending on the particular type of reaction which is involved. This is discussed with reference to the four main types of cellulose reaction. The physical accessibility is defined by the crystalline : amorphous ratio, and the relative accessibilities are illustrated by the reaction rate curve. W. J. M.

Demonstration of the Presence of a Galacto-araban in Raw Cotton Fibre. J. D. Guthrie and W. A. Reeves. *Text. Research J.*, **20**, 859–861 (Dec. 1950).

Galactose and arabinose have been shown to be present in the residue obtained from raw cotton by extraction with acetone. They have been identified by paper chromatography and microscopic and X-ray examination of their crystals. Both were present in the extract in high concentrations, and rhamnose, glucose, and inositol in low concentrations. Another sugar, possibly xylose, was present in trace quantity. Galacturonic acid was absent. W. J. M.

Trace Metals in Cotton Fibre. D. C. Heinzelman and R. T. O'Connor. *Text. Research J.*, **20**, 805–807 (Nov. 1950).

The lints of eight varieties of cotton grown in one locality and of one variety grown in thirteen localities were analysed by ashing and subsequent spectroscopic examination between electrodes of highly purified carbon. The highest, lowest, and average values found for copper, iron, and manganese were 4·01, 0·68, and 1·57; 13·77, 3·74, and 9·03; and 12·39, 2·79, and 6·92 p.p.m. respectively. Some of the variation is attributed to varietal characteristics, but the soil environment and fertilisers are the main contributing factors. Chromium, nickel, and tin were not found. Trace amounts of aluminium, boron, and zinc were found. W. J. M.

Cellulosan of Jute Fibre. P. B. Sarkar. *Nature*, **167**, 357–358 (3rd March 1951).

Holocellulose, obtained from defatted jute with sodium chlorite, is extracted with 9·3% NaOH. On acidifying the extract and adding an equal volume of alcohol, a white amorphous powder, representing > half the original hemicellulose of the fibre and consisting of 1 mol. of monomethoxyuronic acid linked with 6 anhydroxylose units, is produced. Hydrolysis with dil. H_2SO_4 gives an aldobionic acid, which under more drastic conditions splits up into xylose and methoxyuronic acid. In the portion which remains dissolved in the 50% alcohol pentosans and polyuronides are absent, and only galactose can be detected. It appears that all the xylan of jute fibre occurs in combination with methoxyuronic acid, and that either jute fibre contains no cellulosan or has a cellulosan which is free from xylan. J. W. B.

Low-angle X-Ray Scattering from Ramie and Jute. J. Adam. *Nature*, **167**, 78 (13th Jan. 1951).

Measurements of the low-angle scattering from flax, hemp, and jute agree very closely with results previously reported by Heyn, but abnormal behaviour of ramie is not confirmed. Low-angle X-ray photographs of native ramie, dry and swollen in water, show that entry of water into the intermicellar spaces in ramie produces (*a*) a considerable increase in the intensity of the scattering owing to the difference of scattering powers of water and cellulose, and (*b*) a decrease in the total length of streak owing to the increase of intermicellar distances. Low-angle X-ray scattering from dry delignified jute differs little from that obtained with normal jute fibre, but after swelling in water changes take place in a manner similar to the change with ramie. Thus the lignin in jute hinders intermicellar swelling in water. J. W. B.

Extra-cortical Membranes and Layers of the Wool Fibre P. F. Mariner. *Nature*, **167**, 231–232 (10th Feb. 1951).

Surface membranes of wool fibres are produced by treatment in peracetic acid followed by washing and immersion in ammonia. Using micromanipulators, a fine

transparent sheath is detached from the major membrane and may be seen under the phase-contrast microscope with low illumination. Though scale marks are not apparent in the original major membrane, they are evident in the thin epicuticle membrane. In the few places where scale marks are visible on the major membrane, it is impossible to detach any thin membrane, possibly owing to the presence of an adhesive. J. W. B.

Crystalline Structure of the Cuticular Sheath of Wool Fibres. N. Peacock, J. Sikorski, and H. J. Woods. *Nature*, **167**, 408 (10th March 1951).

Lincoln wool fibres are treated over a wide range of times in 3% peracetic acid followed by 0·1 N. or 1 N. ammonia. No residue showing a β-type X-ray photograph is obtained; mild treatment gives an α- and the others an indeterminate photograph. Electron micrographs show some other fibrous material besides the sheath-like structure described by Alexander and Earland (*ibid.*, **166**, 396 (2nd Sept. 1950)), and it is suggested that some cortical material is present. Residues dried at 40°C. contained β-protein, but if dried at 20°C. α-protein only. The β-photograph obtained by Happey (*ibid.*, **166**, 397 (2nd Sept. 1950)) may not therefore necessarily prove the existence of crystalline β-keratin in the untreated fibre. J. W. B.

Effect of Dilute Salt Solutions on the Mechanical Properties of Animal Fibres. H. M. Burte. *Text. Research J.*, **20**, 880–881 (Dec. 1950).

A technique subjecting a wet wool fibre to repeated extension-contraction cycles (~ 1 cycle/min.) between − 5·4% and 15·1% extension shows that immersion in 0·11 N-NaCl for 47·5 hr. causes little change in the force–extension curves, and a state of strain has no accelerating action on the rate of reaction with dilute neutral salt solution. This result is different from those obtained by Katz and Tobolsky (*ibid.*, **20**, 87–94 (1950)), using a continual relaxation technique. This divergence is explained on the basis that with the latter method of investigation bonds were being re-formed in a relaxed, strain-free condition. W. J. M.

Mechanical Properties and the Structure of Hair. C. E. Reese and H. Eyring. *Text. Research J.*, **20**, 743–753 (Nov. 1950).

The contribution to the mechanical strength of hair by the various types of bonds has been measured by the effect of various reagents (acids, bases, oxidising and reducing agents) on the stress at constant elongation. The reactions have been found to be of the first order with respect to the reagent and to the bonds to be broken. The effect of temperature is discussed. The rate of diffusion into the hair has been considered and the diffusion of hydroxyl ions calculated from Fick's second law of diffusion. Applying the theory of absolute reaction rates the heats and entropies of activation for the reaction and for the diffusion have been calculated. The magnitudes of these are briefly discussed. W. J. M.

Topics on Textiles. XII— Mantle Fibre. I. Okamura. *Teifin Times*, **20** (10), 3 (1950): *Chem. Abs.*, **45**, 358 (10th Jan. 1951).

Hermana' mantle fibre (or the akin) of viscose rayon can be eliminated by treating with some swelling agents; e.g. the skin area per total viscose sectional area amounting to 39·6% was entirely removed by immersion in 5% NaOH, while the knot strength per tensile strength increased from 36·5 to 72·8%. C. O. C.

Water-Soluble Silk— an α-Protein. E. J. Ambrose, C. H. Bamford, A. Elliott, and W. E. Hanby. *Nature*, **167**, 264–265 (17th Feb. 1951).

Strong fibres and films are produced from dialysed solutions of fibroin in lithium bromide solution, thus showing that appreciable degradation has not occurred. Amino nitrogen content is sufficiently close to that of natural fibroin to support this view. X-Ray examination of LiBr silk shows that the material is completely amorphous, suggesting random coiling of the molecules. Infra-red spectra of cast films of LiBr silk indicate the α-configuration, the β-configuration being given by insoluble films formed by alcohol treatment. Stretched films of LiBr silk are mainly unoriented β, but a small amount of orientation is evident. Only small quantities of the β-form are necessary to confer insolubility in water. These results agree with the idea that the silk molecule is composed of two types of segment, containing residues with small and large side-chains respectively. In the solid state segments with small side-chains pass to the β-form very readily, whereas those with large side-chains are sufficiently stable to persist in the drawn fibre. J. W. B.

Reaction of Groundnut Protein with Formaldehyde. W. E. Tetlow. *J. Sci. Food Agr.*, **1**, 193–194 (1950): *Chem. Abs.*, **45**, 357 (10th Jan. 1951).

Because of the importance of HCHO in insolubilising protein synthetic fibres, the action of HCHO on Ardein (mixture of arachin and conarachin extracted from defatted monkey nut meal by alkali), deaminated Ardein, arginine-free Ardein, and the fibre derived from Ardein was studied. The results indicate that the ε-amino group in lysine is not the principal factor in the bonding of HCHO by the protein. The maximum in the HCHO-absorption curve on the alkaline side is attributed to arginine; the minimum near the neutral point may be due to salt formation in the region of the isoelectric point of the protein. C. O. C.

Effect of Structure on the Fibre Properties of Linear Polymers. I— Orientation of Side Chains. J. H. Brewster. *J. Amer. Chem. Soc.*, **73**, 366–370 (Jan. 1951).

The polyurethans formed from 1:3-propanediol and 2:2-dimethyl-1:3-propanediol by reaction with hexamethylene di*iso*cyanate are more crystalline that that formed from 2-methyl-1:3-propanediol and the di*iso*cyanate. The latter polymer has unpaired side-chains with random steric orientation. The polyamides of hexamethylenediamine and *meso*-, D-, and DL-$\alpha\alpha'$-dimethyladipic acid all form oriented fibres. All of these fibres are much weaker than nylon; the polymer from the racemic acid is much the weakest of the three. All the "dimethyl" nylons seem to revert slowly from the oriented to the unoriented state. "Dimethyl" nylons undergo a secondary, rapidly reversible cold-drawing when subjected to stress greater than that required for primary cold-drawing. The fibres in this new state of orientation are opaque and lustreless; breakage of fibres always occurred in opaque, lustreless zones. This indicates that even regularly spaced methyl side-chains interfere strongly with polymer crystallinity. C. O. C.

Acid-catalysed Reactions of Nitriles. I— Reaction of Nitriles with Formaldehyde. E. E. Magat, B. F. Faris, J. E. Reith, and L. F. Salisbury. *J. Amer. Chem. Soc.*, **73**, 1028–1031 (March 1951). **II— Polyamides from Formaldehyde and Dinitriles.** E. E. Magat, L. B. Chandler, B. F. Faris, J. E. Reith, and L. F. Salisbury. *Ibid.*, 1031–1035. **III— Reaction of Nitriles with *N*-Methylolamides.** E. E. Magat, and L. F. Salisbury. *Ibid.*, 1035–1037.

I— Nitriles react with formaldehyde in 65–100% H_2SO_4 at room temperature to give yields of methylenebisamides often exceeding 90% in < 1 hr. The reaction is applicable to other aldehydes, but yields are markedly reduced. Methylenebisamides in sulphuric–formic acid solution undergo amide interchange when nitriles are added to the reaction mixture; the new nitrile appears as a component of the new methylenebisamide equilibrium mixture.

II— Infra-red, osmotic pressure, and end-group determination and solubility data show that the polymer formed by treating adiponitrile with formaldehyde in strong H_2SO_4 at room temperature is polymonomethyleneadipamide (16 nylon). Infra-red determinations of CN end-groups suggest that the polymer is highly branched, because of the large excess of CN ends; however, the hydrogenated polymer shows a disproportionately small number of NH_2 ends arising from hydrogenation of the CN ends. The polymer is unusually sensitive to degradation by acids; in 90% formic acid at 30°C. the mol. wt. of the polymer is reduced by 50% in 1 hr. Similar work has been done on other dinitriles and aldehydes.

III— The polymer formed from *NN'*-bishydroxymethyladipamide and adiponitrile is similar to 16 nylon. Competitive rates of reaction of *N*-hydroxymethylamides and formaldehyde with nitriles to yield methylenebisamides show that the nitrile reacts preferentially with the *N*-hydroxymethylamide. C. O. C.

Orlon Acrylic Fibre — Chemistry and Properties. R. C. Houtz. *Text. Research J.*, **20**, 786–801 (Nov. 1950).

Orlon acrylic fibres have been made possible by the discovery of many unreactive solvents for polymers containing a large proportion of acrylonitrile. The structure of these solvents and closely related non-solvents is discussed in relation to their solvent action. Certain polar groupings appear to be involved. Polyacrylonitrile has been fractionated by precipitation, and the molecular weight distribution found to be normal. The relation between intrinsic viscosity and molecular weight is given. The structure appears to be almost complete head-to-tail vinyl addition polymer, and the chains have a high degree of order in only one lateral direction. Its heat resistance is remarkably high but the fibre blackens. Its resistance to acid is also extremely high. The dyeing of Orlon presents considerable difficulties, but it may be carried out by using a carrier such as *m*-cresol or by dyeing at high temperatures under pressure. W. J. M.

Growth and Properties of the Cuprene Fibre. J. H. L. Watson, A. E. Léger, and C. Ouellet. *J. Phys. & Colloid Chem.*, **54**, 969–979 (1950): *Chem. Abs.*, **45**, 924 (10th Feb. 1951).

Cuprene polymer fibres prepared from acetylene by Cu_2O catalysis were used to seed further samples of acetylene, the resulting fibres being used to seed other samples, and so on. All fibres on examination by electron microscopy and X-ray analysis showed the presence of relatively large amounts of Cu and traces of Cu_2O. This shows that Cu and Cu_2O were carried along in fibre growth. Fibre morphology is described, including effect of temperature. C. O. C.

PATENTS

Coloured Polyethylene Terephthalate Fibres. I.C.I. Ltd., R. Hardwick, and L. Wood. *B.P.* 650,923.

An azo coupling component is dissolved in the polyethylene terephthalate before it is spun, to yield fibres capable of being coloured by treatment with a diazonium compound. C. O. C.

Treatment of Rags. Petmar Industries Ltd., L. Marbach, and K. Petrie. *B.P.* 650,996.

Rags are treated with an oxidising agent capable of dissolving part of the wool fibre surface, e.g. permanganate or hypochlorite, followed by an acidic reducing agent, e.g. sodium bisulphite. In a second stage treatment with alkali, e.g. ammonia at pH not < 8, is followed by lubrication, e.g. with an emulsion containing 3% of oil. The treated wool surface is sufficiently slippery for garnetting or grinding without further oiling, and more even fibre properties are also given. J. W. B.

VII— DESIZING; SCOURING; CARBONISING; BLEACHING

Control of the Caustic : Silicate Ratio in Peroxide Bleaching Liquors. K. D. Ballon, J. J. Roarke, and G. M. Gantz. *Amer. Dyestuff Rep.*, **40**, P 218–P 222 (2nd April 1951).

In continuous peroxide-bleaching ranges used for cotton fabrics, the caustic : silicate ratio in the peroxide bath is rather critical, insufficient caustic soda promoting deposition of silica while an excess accelerates peroxide decomposition and leads to poor bleaching. In general, adequate ratio control is maintained by proportioning pumps, flow meters, and periodic titrations for total alkali, but the ratio may be upset by caustic soda being carried over from the first impregnation bath. A rapid volumetric procedure is described for determining the proportions of caustic and silicate, based on the formation of sodium silicate from hydrous silica and sodium fluoride. The mixture is first titrated with acid in presence of methyl red–methylene blue indicator, NaF is added, and a second titration made to the same end-point. The ratio is found by reference to formulæ or to a previously constructed nomogram, which gives adequate accuracy for process control. J. W. B.

Stripping of Wool Dyes with Protection against Chemical Damage. E. A. Leonard and L. Beck. *Amer. Dyestuff Rep.*, **40**, P 178–P 182 (10th March 1951).

Wear tests on carpets show that normal commercial dye stripping entails approx. 25% wear loss, but by stripping in presence of ethylene dibromide emulsions, which strengthens the fibre owing to disulphide link rebuilding, there is less alkali solubility and even an increase in carpet wear resistance. Stripping is also improved. Evaluation of stripping effectiveness in single and compound dyeings and application of the recording spectrophotometer are discussed, together with costing and plant modification due to toxicity of the reagent. J. W. B.

PATENTS

Bleaching Semichemical Pulps. Buffalo Electro-Chemical Co. Inc. and R. L. McEwen. *U.S.P.* 2,527,563.

Semichemical pulp, i.e. one containing about 7–15% by weight of lignin, is initially conditioned or bottomed by treating it in water with a chlorinating agent at pH 3·5–9·0. The amount of active chlorine should be 0·1–1·75% on the dry weight of the pulp. After this the pulp is bleached with alkaline peroxide. There is little or no loss in weight. C. O. C.

Degumming and Bleaching Ramie. S. J. F. Jensen. *B.P.* 650,972.

Ramie is (1) soaked for several hr. in a 0·2% solution of an aluminium salt; (2) boiled for 2 hr. and steeped for a further 6 hr. in approx. 1% NaOH soln.; (3) boiled in acid of concn. $< 0{\cdot}5\%$ HCl; (4) stood for 3 hr., boiled a few hr., and stood a few hr. in a solution of an oxidising salt, e.g. 1% sodium perborate; and (5) subjected to (2), (3), and (4) using more dilute solutions. After washing and drying, the ramie is cut to the appropriate fibre length and spun on cotton machinery. J. W. B.

Fulling Characteristics of a Light-weight Woollen Fabric. K. S. LaFleur. (X, p. 250.)

Mothproofing–Detergent Combinations. H. C. Borghetty, W. N. Pardey, and O. L. Sherburne. (X, p. 251.)

VIII— DYEING

Formation of Surface Films of Dye Solutions and their Solidity. A. Buzágh and J. S. Komáromíné. *Magyar Kém. Lapja*, **4**, 28–34 (1949): *Chem. Abs.*, **45**, 1345 (10th Feb. 1951).

Triphenylmethane dyes can be divided into two classes by using a modified Rhode's torsion apparatus. One class spontaneously forms surface membranes (films), e.g. Eosin, Erythrosin, Phloxin, Fuchsin, Methyl Violet, and Water Blue. Those of the other class form membranes only after addition of electrolytes, and even then the membranes are liquid, not solid, e.g. Crystal Violet, Malachite Green, Brilliant Green, and Acid Green. The polar properties of the dissolved dye play a significant part. Membrane formation is influenced by the basic, acidic, or amphoteric character of the dye. The solidity of membranes of dyes containing NH_2 groups, e.g. Fuchsin, diminished on addition of acids and increased on addition of alkalis. Dyes containing COOH groups, e.g. Eosin, Erythrosin, behaved quite adversely [*sic*]. Water Blue, which contains both a positive and a negative group, gave membranes whose solidity decreased on addition both of acids and of alkalis. These results and data from ultramicroscopic investigations proved the existence of a relationship between changes in the degree of dispersion and solidity of membranes. Increase in fineness of dispersion always caused decrease in solidity of the membrane. Formation of membranes disappears fully at a perfect dissolution (end of colloidal state). Coagulation causes increase in solidity of the membrane, although complete precipitation impedes membrane formation. Presence of the colloidal state promotes membrane formation if simultaneously certain energy effects exist between the dye particles; too large a charge impedes membrane formation as effectively as too rapid discharge. Experiments with the Fuchsin group showed that the more strongly polarised dyes form stronger membranes than less polarised dyes. The calculated abstract values of solidities of certain membranes agreed well with those calculated by Rhode. C. O. C.

Substantive Dyeing in the Light of the Most Recent Studies on the Structure of Swellable Substances. R. Haller. *Schweiz. Arch. angew. Wiss. & Tech.*, **15**, 374–378 (1949): *Chem. Abs.*, **45**, 357 (10th Jan. 1951).

Swelling studies on cotton fibre show that its secondary cell wall is built up of lamellæ, which in turn consist of

fibrils, and these in turn contain very small, round corpuscles called dermatosomes. These corpuscles are probably held together by a swellable amorphous cellulosic binder substance. The more coarsely dispersed substantive dyes, or their high-mol.wt. fractions, penetrate only the surface of the fibre, while the more finely dispersed dyes or fractions are carried into the channels formed by the swollen binder. The more deeply penetrating dye fractions may give the fibre a different colour. When the fibre is treated to inhibit swelling it no longer takes up substantive dyes. The poor penetration of a substantive dye, Diamine Blue 3R, is shown on a dialysing membrane of vegetable parchment (1 hr. at 70–80°c.). By contrast, viscose rayon (shown to have lost most of the structural details of cotton fibre by "carbonisation" with HCl followed by swelling with cupriethylenediamine soln. or by treatment with KI–I_2 followed by swelling with H_2SO_4 (sp. gr. 1·535)) is dyed throughout by substantive dyes. The slow-swelling ramie fibre is penetrated even less by substantive dyes, so that a dye layer on its surface comes off at once in H_2SO_4 (sp. gr. 1·535), leaving the fibre colourless before its dissolution gets under way. C. O. C.

Kinetics of Wool Dyeing. II— Adsorption of Surface-active Dyes by Wool and Other Fibres. P. Alexander and D. A. Charman. *Text. Research J.*, **20**, 761–770 (Nov. 1950).

The rate-of-dyeing curve of wool with a dye having a long hydrocarbon chain (Carbolan Crimson B8 (ICI)) shows a rapid initial adsorption followed by a slow process. The shape of the curve is compared with that obtained from a typical direct dye, and it is concluded that the initial adsorption corresponds to surface adsorption due to the surface activity of this type of dye. The surface tension of the dyes studied was measured at different concentrations and with varying amounts of sodium acetate. This showed correlation with the dyeing properties, and it was concluded that the surface activity of the dye caused adsorption at the largely non-polar surface of the fibre and contributed substantially to the high substantivity of this dye anion. W. J. M.

Dyeing of Wool with Vat Colours with particular emphasis on the Anthraquinone Types. A. E. Weber. *Amer. Dyestuff Rep.*, **40**, P 78–P 83 (5th Feb. 1951).

By paying attention to a number of critical features, practically all the anthraquinone vat dyes may be dyed on wool in light, medium, or dark shades including black, without undue adverse effect on the strength and handle. A typical heavy dyeing is described, using a dye (*C.I.* 1113) requiring a highly alkaline bath. Worsted top (625 g.) is wound on a perforated spindle and set in an experimental laboratory machine, which is then charged with (*a*) water at 75°F. (5400 ml.), 10% Calgon (15 ml.), Tergitol (6 ml.), 10% glue (31 ml.), and salt (200 g.); (*b*) 10% (by vol.) NaOH (231 ml.) and sodium hydrosulphite (35 g.); (*c*) stock vat (1000 ml.) containing dye paste (50 g.) and caustic soda and sodium hydrosulphite (11·3 g. each). The temperature is raised to 110°F. during 30 min., after which the wool is rinsed with water at 50–70°F. until it is colourless to phenolphthalein. Rinsing is continued up to 140°F. for a further 30 min., followed if desired for 10 min. at 190°F. with 5–8% H_2SO_4 to improve the hue and fastness. Data are included of pump pressure observations in relation to top compression, and a selection of suitable vat dyes for a full colour range is described together with details of necessary quantities of auxiliaries. The effects on chlorinated wool, union fabrics, and yarn and piece goods are discussed, together with aspects of costing and control. J. W. B.

Nylon Dyeing— Theory and Practice. G. T. Douglas. *Amer. Dyestuff Rep.*, **40**, P 122–P 126 (19th Feb. 1951).

The theory of nylon dyeing is presented in a simplified form with discussion of the influence of the chemical groupings, e.g. the small number of amino groups compared with wool, which inhibits production of deep shades with acid dyes, and the effect of degree of sulphonation in the dye molecule. Various dye ranges for nylon are assessed, and some practical difficulties, e.g. application of chrome dyes, are mentioned. Combinations for dyeing wool–nylon unions are given, and stress is laid on the necessity of knowing individual dye characteristics. J. W. B.

Affinities for Paper Fibre of the Most Important Classes of Dyes. K. Kretzl. *Wochbl. Papierfabr.*, **78**, 337, 338, 340, 342, 344 (1950): *Chem. Abs.*, **45**, 1342 (10th Feb. 1951).

The validity of the generally accepted hypothesis that retention of acid and basic dyes is due to adsorption and that this follows the course of the Freundlich adsorption isotherm (I) has been investigated using Benzopurpurin (II), Rhodamine (III), and Congo Red (IV). The stock (V) used consisted usually of 53% unbleached chemical pulp and 47% groundwood, lightly beaten (to 22° Schopper–Riegler) and very lightly sized; it contained 6·1% ash and had pH 4·5. Samples of V (30 g. wet weight containing 2 g. dry pulp) were treated with gradually increasing amounts of dyes in aqueous solution. The mixture was stirred for 0·5 hr. and filtered, the residual dye in the filtrate determined colorimetrically, and the dye retention calculated. Graphs show to what extent this retention followed the course of I. Up to 10–20% dye concentration, the curves were practically coincident with I; thereafter they flattened out. However, when the dye solution was in contact with V for long periods (in some cases 30 hr.), further adsorption occurred, and the curve again followed that of I. Of the three dyes, II had least affinity, III had appreciably higher affinity, and IV the highest affinity. IV was retained much more by chemical than by mechanical pulp, the former appearing to favour chemical bonding with IV; thus the retention curve is not coincident with that of I. In presence of mechanical pulp the graph lies closer to I. Dye sorption is reversible, and, when concentration of the dyebath is lowered, appreciable amounts of II and III leave the fibre and return into the solution. In practice this would mean substantial loss, because after beater additions dilution of the stock is essential. In mill practice, however, this difficulty is met by using the (coloured) white water from the machine for diluting stock coming from the beater. C. O. C.

Spontaneous Colour Changes during Oxidation Dyeing of Furs. V. A. Pchelin and V. S. Agafonova. *Legkaya Prom.*, **10**, (7), 21–24 (1950): *Chem. Abs.*, **45**, 889 (25th Jan. 1951).

In dyeing furs black with a mixture of Ursol T (*m*-tolylenediamine) and Ursol D (*p*-phenylenediamine), the initial reaction involves formation of aminomethylindamine, which is subsequently converted to a phenazine structure. The mechanism and kinetics of the reaction are discussed. C. O. C.

PATENT

Colouring Acetate Rayon. T. E. Marchington & Co. Ltd. and G. D. Sutton. *B.P.* 650,990.

Deep dyeings are obtained on cellulose acetate by treating in a bath containing the acid leuco compound of a vat dye and 30% or more of a water-soluble swelling agent. There is no saponification of the cellulose acetate and dyeing proceeds rapidly at low temperatures. C. O. C.

IX— PRINTING

Studies in Textile Printing— Practical Applications of the Analytical Method. R. D. Greene, A. F. Klein, and F. Fordemwalt. *Amer. Dyestuff Rep.*, **40**, P 127–P 130 (19th Feb. 1951).

Three measurements of a vat print are made — (1) amount of dye deposited by printing, (2) amount remaining on the fabric after ageing, oxidising, and soaping, and (3) colour value of the completed print. From these values are calculated (*a*) relation between (1) and (2) as the *percentage fixation*, (*b*) between (2) and (3) as the *colour efficiency*, and (*c*) between (3) and (1) as the *printing efficiency*. Dye is solvent-extracted from a measured sample of fabric, the concentration of the extract and the colour value of the print being measured spectrophotometrically. Studies are made on the influence of different thickness, on running time, special methods, and screen printing. Usefulness is shown in evaluating printing processes that cannot be assessed by the usual colour-value testing procedures. J. W. B.

Photosensitivity of Stabilised Diazo Films. L. Mester. *Magyar Kém. Lapja*, **5**, 20–22 (1950): *Chem. Abs.*, **45**, 965 (10th Feb. 1951).

Three factors, viz. pH, structure of diazo compounds, and sensitising agents, influence the photosensitivity,

which is generally higher at pH < 7 than at pH > 7. Among the diazoanhydrides, the *ortho* and *meta* compounds usually show high stability and photosensitivity. Another group of suitable diazo compounds contain *p*-amino groups. Presence of substituents in the 2 and/or 5 positions significantly increases the photosensitivity of such compounds. Anthraquinone, *p*-diazodiphenylamine, aromatic ketones, coumarins, quinoxaline, etc. are effective sensitisers of diazo films. C. O. C.

Photographic Pigment Printing Processes. W. G. Alexewiez. *PSA Journal*, **16B**, 99–104 (1950).

PATENTS

Pigment Prints. Interchemical Corpn., N. S. Cassel, and A. T. Clifford. *U.S.P.* 2,527,530.

Unusually full and even colour value is obtained by using a printing paste made by dispersing a pigment in a homogeneous colloidal aqueous solution of a hydrophilic colloid, e.g. a solution of hydroxyethyl cellulose in alkali. By adding a second hydrophilic colloid, e.g. methyl cellulose, to the paste and gelling it under conditions under which the first colloid remains in solution, flocculation of the pigment during printing is prevented. Addition of a water-soluble thermosetting resin to the paste gives prints which are fast to washing. C. O. C.

Organic Esters and Nitriles containing an Active Methylene Group as Azo Coupling Components in Diazotype Printing. General Aniline & Film Corpn., W. H. von Glahn, and L. N. Stanley. *B.P.* 650,631.

Compounds of formula $R^1{\cdot}CH_2{\cdot}CO{\cdot}R^2$ (R^1 = acyl, carbalkoxy, cyano, or carbiminoalkoxy; R^2 = alkoxy, carbalkoxy, aryl, or heterocyclic), e.g. ethyl acetoacetate, methyl cyanopyruvate, or 1-cyanoacetyl-2-naphthyl methyl ether, are especially effective as azo coupling components for diazotype reproduction in conjunction with a light-sensitive diazonium salt of a *p*-diamine of the benzene series. When used for shading purposes in combination with phloroglucinol, 2:3-dihydroxynaphthalene, or 2:3-dihydroxynaphthalenesulphonic acid, excellent neutral blacks are obtained. C. O. C.

Colour Photography. I.C.I. Ltd., K. O. Ganguin, N. H. Haddock, and E. Macdonald. *B.P.* 651,059.

In subtractive colour photography, a yellow styryl dye is introduced as a mask into the magenta layer by using a colourless colour former and, after developing the image, converting the residual colour former into a dye, e.g. by treating the residual magenta colour former (which contains a reactive methylene group) with an aromatic aldehyde. C. O. C.

***N*-Substituted *iso*Alloxazines as Catalysts in Colour Photography Dye Bleach Baths.** General Aniline & Film Corpn. and F. W. H. Mueller. *B.P.* 651,124.

Diazotype Compositions containing Ethylene Oxide Derivatives of Amino Diazo Compounds. General Aniline & Film Corpn., W. H. von Glahn, L. N. Stanley, and G. T. Parker. (IV, p. 243.)

X—SIZING AND FINISHING

Applications of Organosilicon Compounds on Rayon Yarn. K. Suzuki and S. Shiraki. *Bull. Research Inst. Teikoku. Jinzo Kenshi Kaisha Ltd.*, **2**, (1), 9–22 (1950): *Chem. Abs.*, **45**, 359 (10th Jan. 1951).

Rayon yarn treated with $Si(O{\cdot}C_{14}H_{33})_4$ (I) (from 0·32 mol. $SiCl_4$ dropped for 3 hr. into 1 mol. $C_{14}H_{33}OH$ (II) at 50°c., dissolved in benzene, and filtered at pH 7 adjusted with solid NaOH), $(C_{14}H_{33}{\cdot}O)_2Si(O{\cdot}C_2H_5)_2$ (III) (from 0·5 mol. $SiCl_4$ dropped into a mixture of II and C_2H_5OH (1 : 1 mol.) and refined similarly), or $Ti(O{\cdot}C_{14}H_{33})_4$ and I (from a mixture of $TiCl_4$ and $SiCl_4$ (0·125 : 0·125 mol.) dropped into 1 mol. of II and refined similarly) became more heat-resistant, the effect showing at as small an adsorption as 1%. III in low concentration, but not I and II, increased the dry and wet strength of the yarn. Yarn treated with these esters became slightly more adhesive. Cord woven from the yarn, treated with a 0·5–2·0% soln. of the esters and then with a 20–50% soln. of natural rubber latex, casein, phenol– or thiourea–formaldehyde resin, was as adhesive as a cotton cord. C. O. C.

Distortion, Rigidity, and Shrinkage—their Relationship to Wet and Dry Finishing of Wool Fabrics. Anon. *Wool Record*, **79**, 631, 633, 635 (22nd Feb. 1951).

Fulling Characteristics of a Light-weight Woollen Fabric. K. S. LaFleur. *Amer. Dyestuff Rep.*, **40**, 145–148 (5th March 1951).

Strips of woollen material 10 in. × 70 in. are milled in a laboratory fulling mill, and comparison is made of the felting properties in media of different pH and containing different types of auxiliaries. Fat-derived products, e.g. soaps, sulphonated tallow, and quaternary fatty acid amides, give felts with the best handle, but felting is slow; it is uncertain whether slow felting is an essential or coincidental factor. No product is found which is commercially ideal for both felting and scouring, soap being the best single product, soap with a hydroxyalkylamide condensate for milling and scouring, and a sulphonated tallow with a polyoxyethylene condensate for saline scouring. J. W. B.

Factors affecting the Shrink Resistance of Wool. Harris Research Laboratories. *Textile Series Report* No. 55. Office of the Quartermaster General, Washington D.C. ORR 544/50* (PB 110,059).

Microfilm copy (38 frames) of a progress report in which an instrument for measuring the frictional properties of fibres in any medium is described. Shrinkage decreases with increase in pH of the washing liquor. It appears that the shrink-resistance of resin-treated fabrics is due rather to the fibres being bonded to each other than to any modification of their frictional properties or their stress–strain characteristics. For a given time and pH of chlorination, reduction in felting power is approximately linearly related to the chlorine concentration. C. O. C.

* Photocopies available from T.I.D.U., Board of Trade, Lacon House, Theobalds Road, London W.C.1, or (under PB No.) from Office of Technical Services, Department of Commerce, Washington D.C.—see J.S.D.C., **66**, 53 (Jan. 1950).

Synthesis of Polymers in Reduced Wool. M. Lipson and R. J. Hope. *Australian J. Sci. Research*, **3A**, 324–329 (1950): *Chem. Abs.*, **45**, 300 (10th Jan. 1951).

Experiments *in vitro* show that cystine in presence of some oxidants may act as a powerful catalyst for polymerising ethylenic monomers; this helps to explain the reactions occurring when wool is reduced with $NaHSO_3$ and then treated with a monomer. Polymerisation within the fibre is probably initiated by free radicals produced from reduced cystine by the action of sulphoxides or sulphones present in the wool as the result of atmospheric oxidation. Fraction (A and B) of the cystine appears to be involved, as pretreatment with alkali, which converts this fraction to lanthionine, stops polymerisation. Little or no polymer can be formed in wool from the base of a staple, whereas the polymer can be synthesised quite readily in the tip, where oxidation products are more likely to be present. If, however, wool from the base is treated with a mild oxidant, polymerisation occurs as readily as in the tip. The polymer seems to be bound chemically to the wool through the thioether linkages. C. O. C.

Factors affecting the Relaxation Shrinkage of Circular Knit Cotton Fabric. *Textile Series Report* No. 57. Office of the Quartermaster General (U.S.), Military Planning Division, Research and Development Branch. ORR 565/50* (PB 98,574).

Microfilm (29 frames) of report written in June 1949. The importance of tightening the fabric structure as a means of reducing potential laundering shrinkage is stressed. Present-day wet processing relaxes the fabric, but not sufficiently to overcome the major shrinkage-inducing strains introduced during knitting. Calendering has a determining effect on shrinkage of the finished fabric, and adjustments of the directional shrinkage of knit underwear may be made during this process. By employing optimum knitting and finishing conditions, the potential shrinkage of underwear was reduced by a half. C. O. C.

* Photocopies available from T.I.D.U., Board of Trade, Lacon House, Theobalds Road, London W.C.1, or (under PB No.) from Office of Technical Services, Department of Commerce, Washington D.C.—see J.S.D.C., **66**, 53 (Jan. 1950).

The Delustring of Acetate Rayon. R. J. B. Marsden and A. R. Urquhart. *J. Textile Inst.*, **42**, T 15–T 78 (Feb. 1951).

This is a comprehensive account of numerous experiments on the delustring of cellulose acetate. Methods of sampling cloth and measuring lustre are described, together with assessment of other factors such as strength,

handle, etc. A large number of processes are investigated and are varied widely within themselves. The mechanism of delustring is discussed together with consideration and photographs of faults. An appendix includes methods of determining the concentration of phenol and cresol in delustring liquors. J. W. B.

Stabilisation of Zein Filaments by Baking. C. B. Croston and C. D. Evans. *Text. Research J.*, **20**, 857–858 (Dec. 1950).

Filaments spun from formaldehyde-treated alkaline dispersions of zein are stabilised by baking at 160°C. Decreased shrinkage in water at room temperatures results, and is particularly evident in larger filaments or bristles. The effects of baking at 100–180°C. on the strength and shrinkage in water are shown. The strength is not appreciably reduced after baking at 160°C. W. J. M.

Literature Survey of Waterproofing and Water-repellency of Textiles. *Bibliographic Series* No. 2, Technical Library, Quartermaster Research & Development Laboratories, Philadelphia. ORR 567/50* (PB 98,016).

Microfilm copy (66 frames) of a survey written in 1947 of the journal and patent literature for 1937–1947, there being 230 items. C. O. C.

* Photocopies available from T.I.D.U., Board of Trade, Lacon House, Theobalds Road, London W.C.1, or (under PB No.) from Office of Technical Services, Department of Commerce, Washington D.C.—see J.S.D.C., **66**, 53 (Jan. 1950).

Effect of Non-durable Aluminium Salt–Wax Emulsions on the Wear Resistance of Textiles. S. J. Tanenhaus and M. E. Darby. ORR 24/51* (PB 100,362).

Wear tests conducted over several years for the U.S. Quartermaster General have shown that application of a non-durable Al salt–wax emulsion for increasing wear resistance is not warranted for garments subjected to severe wear or severe laundering, but that it may be justified for fabrics subjected to moderate wear and laundering. Field serviceability cannot be predicted by any of the laboratory tests investigated. C. O. C.

* Photocopies available from T.I.D.U., Board of Trade, Lacon House, Theobalds Road, London W.C.1, or (under PB No.) from Office of Technical Services, Department of Commerce, Washington D.C.—see J.S.D.C., **66**, 53 (Jan. 1950).

Odour Prevention in Resin-treated Fabrics. L. A. Fluck, G. J. Keppler, T. F. Cooke, and C. L. Zimmerman. *Amer. Dyestuff Rep.*, **40**, P 154–P 160 (5th March 1951).

Textiles treated with thermosetting aminoplasts, e.g. urea– or melamine–formaldehyde resins, develop unpleasant odours under certain conditions, e.g. in hot humid weather. It is suggested that this is due to methylamines formed by reaction between formaldehyde and ammonium salts used as polymerisation catalysts; in support of this, fishy odours are produced in the laboratory by baking cotton cloth which has been impregnated with appropriate reagents in absence of resin, and standing in a warm humid atmosphere. Odour prevention is attempted by using (*a*) a formaldehyde acceptor which reacts preferentially with the formaldehyde, and (*b*) a non-ammonium salt catalyst. Method (*a*) is found more suitable, urea being added to the resin bath. A sensitive and reproducible odour test is described, and a summary given of the necessary conditions for commercial processing. J. W. B.

Mothproofing–Detergent Combinations. H. C. Borghetty, W. N. Pardey, and O. L. Sherburne. *Amer. Dyestuff Rep.*, **40**, P 119–P 121 (19th Feb. 1951).

A substantive cation-active mothproofing agent is combined with a non-ionic synthetic detergent to give a combination which serves simultaneously as a mothproofing and washing agent, e.g. 3:4-dichlorobenzyltriphenylphosphonium chloride (6 parts by wt.) dissolved in a mono*iso*octylphenyl ether of polyethylene glycol (34) and water (60). Application may be in either the factory or the household, as the system will function at low temperature. It is fast to limited soap and water washing and to repeated dry-cleaning or washing in non-ionic detergents. J. W. B.

PATENTS

Reducing the Felting Power of Wool. du Pont and M. E. Cupery. *U.S.P.* 2,526,637.

The wool is impregnated with a solution of a high-mol. wt. basic amino polymer and formaldehyde and then kept at 20–200°C. until the amino polymer becomes insoluble in water and organic solvents. The amino polymer must have an H on the amino N atom and contain a chain of 3–50 C for each amino group, e.g. a hydrogenated carbon monoxide–aliphatic olefin–ammonia or primary monoamine copolymer. The wool should take up 7–10% by weight of the amino polymer. There is no advantage in applying more than 10% of the polymer, and in fact over-impregnation results in poor handle. C. O. C.

Impregnating Textiles with Cyclic Imides. Phillips Petroleum Co. and C. M. Himel. *U.S.P.* 2,526,948.

Fibres of all types are impregnated with an alkaline aqueous solution of a half-acid amide of maleic, succinic, glutaric, or phthalic acid, then treated with an aqueous solution of a strong mineral acid, and finally heated at 200–350°F. to convert the amide into the corresponding imide. The process can be used for imparting a water-repellent, mothproof, or flame-resistant finish to textiles or for rendering the cloth more readily dyed level. For example, *N*-hexadecyltetrachlorophthalamic acid is used for waterproofing cotton textiles, *N*-dodecylphthalamic acid chlorinated to 50–60% Cl content is used to render wool water-repellent and mothproof, and the phthalamic acid from phthalic anhydride and 2:2′:2″-trihydroxy-*tert.*-butylamine $(HO{\cdot}CH_2)_3C{\cdot}NH_2$ for rendering cloth more readily dyed level. C. O. C.

Slip-resistant Finish. Monsanto Chemical Co., D. H. Powers, and W. J. Harrison. *U.S.P.* 2,527,329.

A slip-resistant finish is obtained by treating the fabric with an aqueous colloidal solution of silica so as to deposit 0·1–5·0% SiO_2 on the fabric and then drying at 200°F. without allowing the solution to gel. C. O. C.

Caustic Stannate–Urea Treatment of Cotton Fabrics. United Merchants & Manufacturers Inc., O. K. Heim, and C. L. Mantell. *U.S.P.* 2,527,140.

Cotton fabric is given improved dimensional stability and a stiffer handle by treating it with a solution of commercial sodium stannate (44% SnO_2 content) (2–6% by weight), caustic soda (10–22%), and urea (10%) at room temperature for 10–120 sec., tentering to its original width, neutralising with dilute acid and rinsing with water, in either the stretched or unstretched condition, and then tenter-drying. It is generally desirable first to degrade the cotton to render it more susceptible to the action of the solution, e.g. by treating it with an alkali-metal hypochlorite. C. O. C.

Treating Cotton Fabrics with Urea–Alkali–Zincate Solution. United Merchants & Manufacturers Inc., O. K. Heim, and C. L. Mantell. *U.S.P.* 2,527,141.

Cotton fabric is given improved dimensional stability, freed from fuzz, and rendered stiffer and somewhat translucent by treating it with an aqueous solution of urea (2–20% by weight), Na or K zincate (2–10% ZnO), and NaOH or KOH (6–28%) for 1 sec.–24 hr., drying under tension, neutralising, and then rinsing. C. O. C.

Treating Regenerated Cellulose Fabrics with Urea–Alkali–Zincate or –Stannate Solution. United Merchants & Manufacturers Inc., C. L. Mantell, and T. J. Dabrowski. *U.S.P.* 2,527,142.

Spun or filament regenerated cellulose fabrics are given improved dimensional stability, stiffness, a degree of translucency, and a clear-cut appearance by treating them with an aqueous solution of urea (3–15% by weight), Na or K zincate (1–4% ZnO), and NaOH or KOH (9–18%) for 10–60 sec., stretching the fabric, flushing the solution from the fabric, and drying while stretched.

U.S.P. 2,527,143.

An aqueous solution of urea (1–15% by weight), stannic oxide (1–2%, preferably as commercial Na stannate), NaOH or KOH (9–18%) is used under the same conditions. C. O. C.

Permanent Lustrous Finish. Joseph Bancroft & Sons Co. and A. L. Lippert. *U.S.P.* 2,524,915.

A mechanical finish which resists water is obtained by impregnating a chintz fabric with an aqueous solution

containing 10–30% urea–formaldehyde resin precondensate and a normally fluid water-miscible wetting oil having a chain of > 8 C, drying to dampness, glazing, and then curing the resin. The amount of oil present must be at least sufficient to prevent the resin from sticking in the glazing calender and may be up to 60% by weight of the resin components. C. O. C.

Coating or Impregnating Glass Fabrics. Ciba Ltd. *B.P.* 650,682.

Glass fabric is given dyeing properties while remaining permeable to air by treatment with an aqueous dispersion of a polyvinyl compound. The dispersion must contain no cellulose or water-insoluble cellulose ether. C. O. C.

Water-repellent Finish. Dow Corning Corpn. and S. L. Bass. *B.P.* 650,131.

Hydrophilic materials are rendered water-repellent by treating them with monomethyldiethoxysilane vapour. The water-repellent effect is improved if the treated material is heated at 30–150°c. C. O. C.

Water-resistant Flameproof Finish for Cellulosic Textiles. Pond Lily Co. and O. Edelstein. *U.S.P.* 2,526,462.

The material is impregnated with a mixture of a flame-retardant, e.g. ammonium sulphate or phosphate, and urea or dicyandiamide and then heat-cured. C. O. C.

Imparting Durable Mildew Resistance to Cellulose. Joseph Bancroft & Sons Co., F. M. Ford, and W. P. Hall. *U.S.P.* 2,524,783.

Cellulose is rendered mildew-resistant by impregnating with an aqueous solution of 1 mol. of phosphoric acid and 1–4 mol. of urea, drying, and then baking for 2–30 min. at 400–300°F., and finally washing and drying. The strength of the solution should be such that 0·2–4·5% of acid on the dry weight of the cellulose is picked up, the pH such that the pH of the cured fabric before washing is 2–7, and the time of impregnation such as to introduce into the cellulose–acid complex an acid : pyranose units ratio of 1 : 20–600 in the final products. C. O. C.

Puckering a Thermoplastic Fabric by Heating it on one Side. Celanese Corpn. of America and F. G. Dodge. *U.S.P.* 2,524,895.

Puckered effects are produced by passing one side of an untensioned, undelineated, even-surfaced fabric containing filaments of a thermoplastic material in free, over-all contact with a smooth flat surface kept at a temperature sufficiently high at least to soften the thermoplastic material. C. O. C.

Coating or Laminating Starch-free Resin-sized Fabrics. Dan River Mills Inc., H. M. Chase, and H. Y. Jennings. *U.S.P.* 2,525,476.

A balanced coated or laminated fabric, i.e. one having the same tensile strength in warp and weft directions, is readily obtained by using as components cloths which have been woven from fibres free from starch and whose warps and, if desired, wefts have been sized with a resin which is compatible with the coating or adhesive subsequently applied. C. O. C.

Runproof Stocking. Monsanto Chemical Co., W. J. Harrison, and D. H. Powers. *U.S.P.* 2,526,684.

Fine or sheer knit fabrics are rendered resistant to runs and snags by treating them with a dilute colloidal solution or dispersion of polymerised silica so as to deposit 0·1–5·0% by weight of silica on the fabric. The resulting finish withstands mild washing. C. O. C.

Fused Collars. Buffalo Electro-Chemical Co. Inc., F. P. Greenspan, and F. X. Nerney. *U.S.P.* 2,527,546.

Wilt-proof and slightly stiffened but highly flexible collars which stand up to repeated washings are obtained by fusing a lining and facing to an interlining containing grey cotton and soluble and thermoplastic acetate rayon, the interlining being first treated with an aqueous solution containing 0·5–3·0% peracetic acid (on the weight of the interlining) stabilised with a polyphosphate at pH 5–7 and 150–200°F. for not > 3 hr. This bleaches the cotton without affecting either its strength or the solubility and thermoplasticity of the acetate rayon. C. O. C.

Bonding Fibres to Adhesive Surfaces. H. Ewing and J. S. Blackmore. *B.P.* 650,988.

Fibres or other particulate materials are distributed evenly on an adhesive surface, e.g. plasticised polyvinyl acetate on a fabric backing, by passing the surface through an electrostatic plate condenser, feeding the fibres between one plate and the surface, and alternately charging and discharging the condenser through a variable spark gap in such a way that the fibres move rapidly to and fro between the surface and plate until they become embedded in the adhesive. After brushing to remove loose fibres and produce an even pile, the adhesive is heat-hardened. J. W. B.

Agent for Producing a Durable Finish on Textiles. United Merchants & Manufacturers Inc., W. R. Tornquist, and L. H. Vandermark. (III, p. 239.)

XI—PAPER AND OTHER CELLULOSIC PRODUCTS

Formation of Lignin in Plants [Lignins M and F]. M. S. Bardinskaya. *Doklady Akad. Nauk S.S.S.R.*, **76**, 435–437 (21st Jan. 1951).

The relative responses of two common tests for lignin, the Mäule permanganate–ammonia and the acid–phloroglucinol reactions, are known to vary according to the origin of the lignin; thus only the Mäule reaction gives a characteristic response to angiosperms, while acid–phloroglucinol is characteristic for gymnosperms. This behaviour has been attributed to the existence of two types of lignin—M and F respectively. It is now shown how preparations of the two types of lignin may be made from the lignified tissue of young plants. After a thorough extraction with a mixture of alcohol and benzene, the tissue is washed with water and extracted with 2% NaOH on the water-bath. Lignin F is contained in the alkaline extract, while lignin M remains in the residue. Extract and residue are treated further to give the required preparations. Lignin F is readily soluble in alkalis and in conc. mineral acid; its alkaline soln. gives an ultra-violet absorption spectrum similar to the spectra recorded in the literature for alkaline solutions of various lignins. Lignin M is insoluble in alkalis and acids. A. E. S.

PATENTS

Coating Colours for Paper. Minnesota & Ontario Paper Co., W. H. Barrett, and E. Zimmerman. *U.S.P.* 2,526,598.

A mixture of starch, pigment, and water is continuously passed through a restricted passage, where it is subjected to high shearing and centrifugal forces, after which it is cooked at 160–180°F. C. O. C.

Affinities for Paper Fibre of the Most Important Classes of Dyes. K. Kretzl. (VIII, p. 249.)

XIII—RUBBER; RESINS; PLASTICS

Amine–Aldehyde Resins for Coating or Impregnating Textiles, Paper, Leather, etc. du Pont and M. E. Cupery. (III, p. 239.)

Conversion of Bhilawan Shell Liquid to a Non-vesicating Drying Product for the Manufacture of Lacquer Varnish, Stoving Enamels, Waterproofing or like Materials. S. Siddiqui and D. C. Dhar. (III, p. 239.)

Siliceous Products useful as Waterproofing Agents. Société des Usines Chimiques Rhône-Poulenc. (III, p. 240.)

Fibres and Fabrics [from the Viewpoint of the Rubber Industry]. J. W. Illingworth. (VI, p. 246.)

XIV—ANALYSIS; TESTING; APPARATUS

Molecular Interaction and its Relation to the Formation of Sodium Dodecyl Sulphate–Cetyltrimethylammonium Bromide Complex. R. Matalon, M. R. J. Salton, and M. Cohen. (III, p. 238.)

Control of the Caustic : Silicate Ratio in Peroxide Bleaching Liquors. K. D. Ballon, J. J. Roarke, and G. M. Gantz. (VII, p. 248.)

Studies in Textile Printing—Practical Applications of the Analytical Method. R. D. Greene, A. F. Klein, and F. Fordemwalt. (IX, p. 249.)

Effect of Non-durable Aluminium Salt–Wax Emulsions on the Wear Resistance of Textiles. S. J. Tanenhaus and M. E. Darby. (X, p. 251.)

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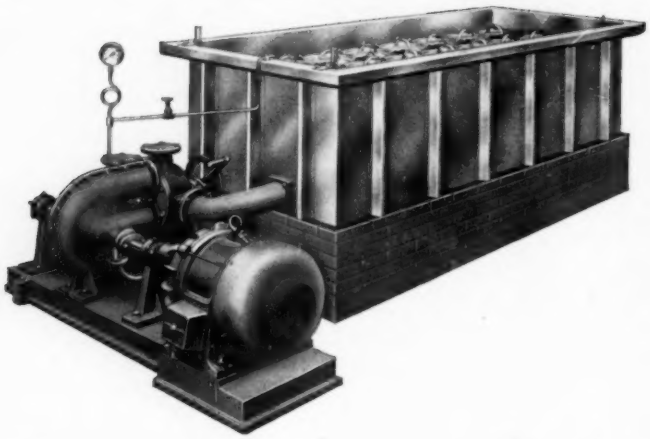

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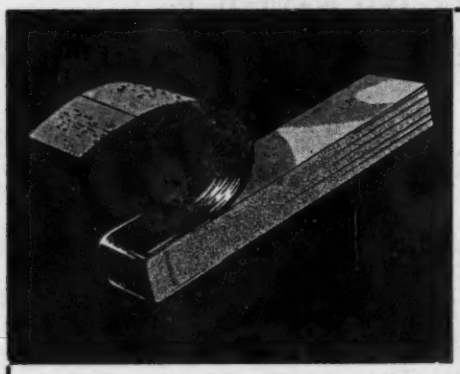

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Volume 1

Compiled and published jointly by the Textile Institute
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Editors

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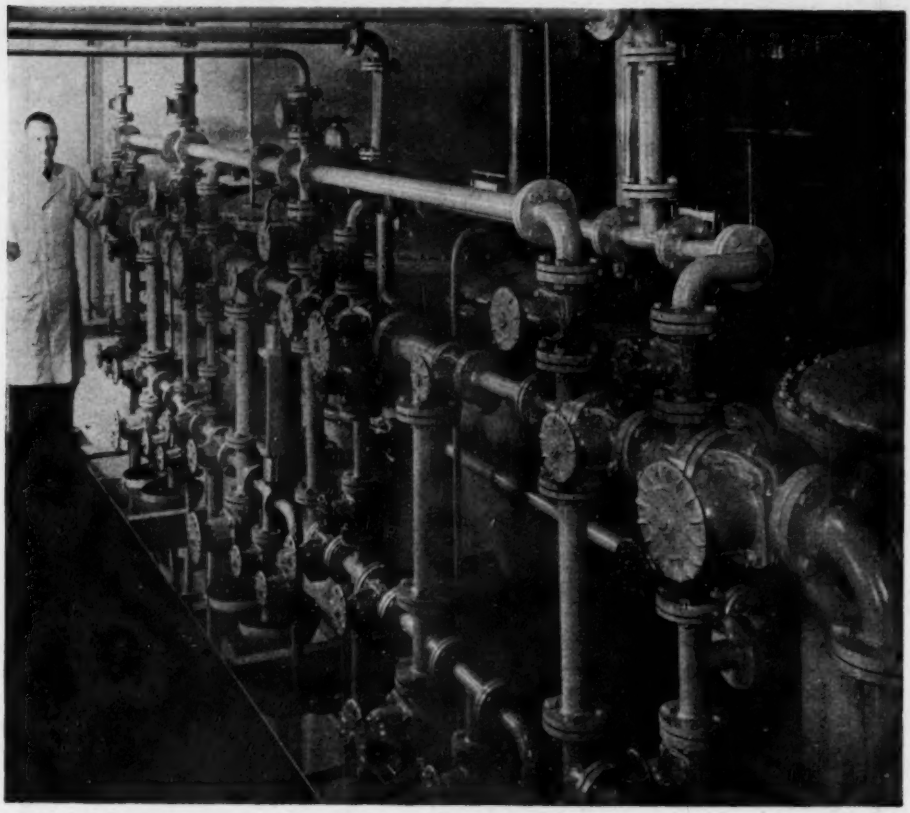

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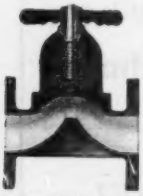

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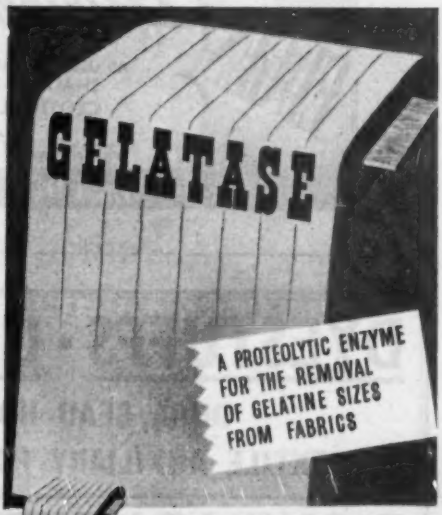

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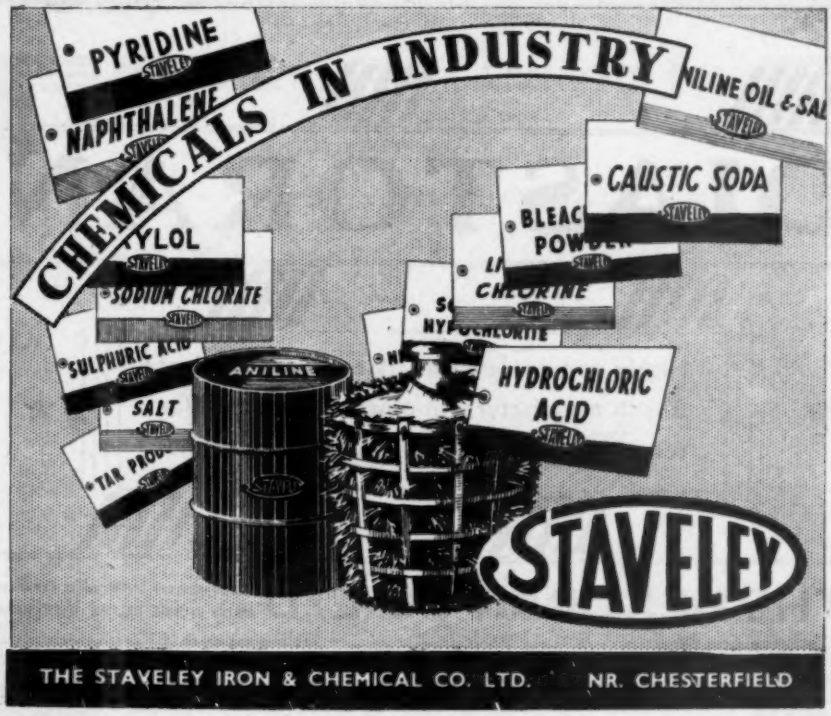

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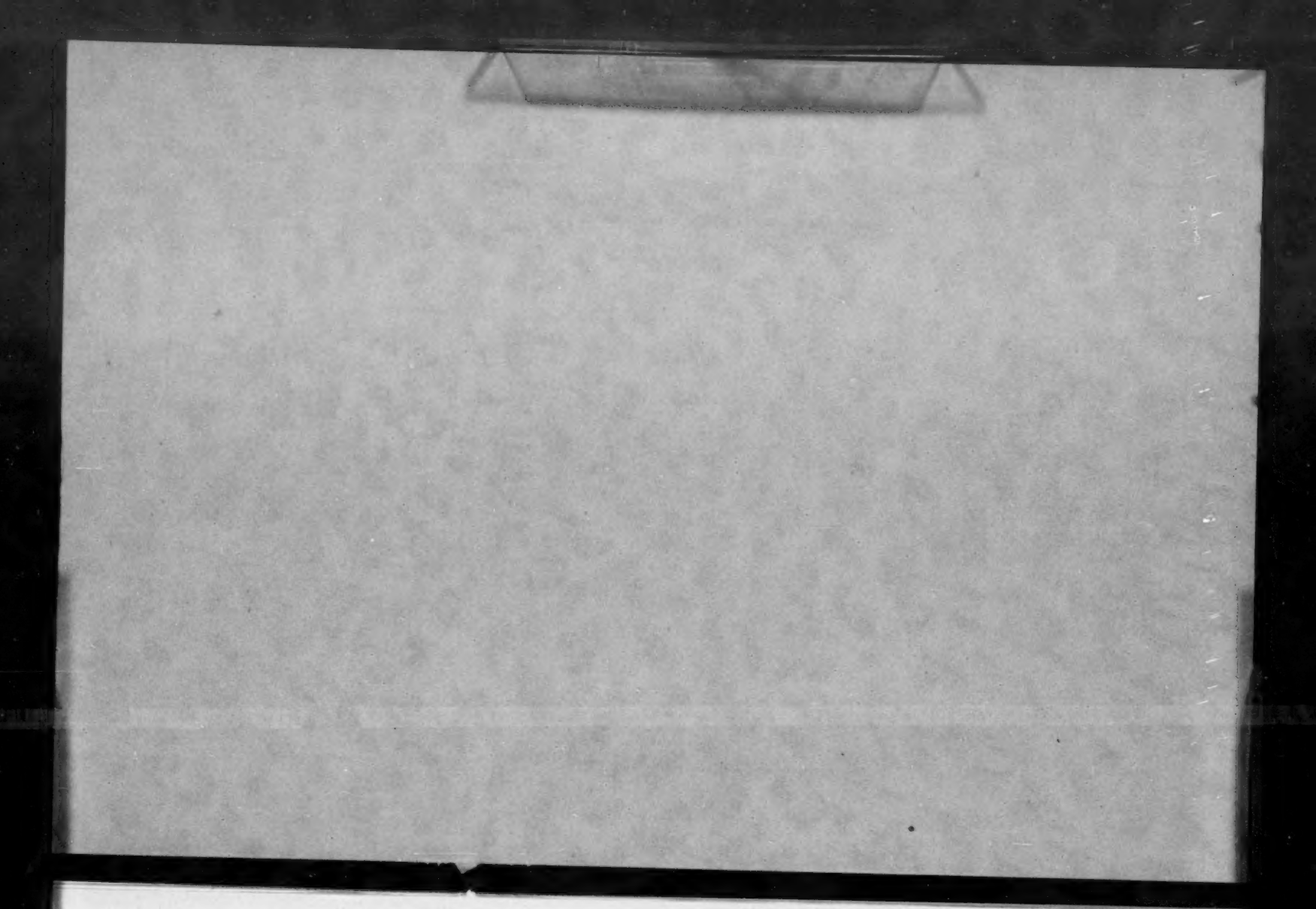

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